Knight Piésold
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Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

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Executive Summary

Since the submission of the Developer's Assessment Report (DAR), there have been changes in the mine plan. While the mining plan in the DAR includes the Ormsby deposit and the Nicholas Lake deposit, the current mine plan for permitting includes only the Ormsby deposit. In addition, the proposed waste rock facilities have been relocated to the areas between Narrow and Winter Lakes and the Discovery Mine Tailings cap, and the concept for the proposed Tailings Containment Area (TCA) has been revised to better handle the expected process streams from the Yellowknife Gold Project (YGP) mill.

The revised mine plan includes a revised TCA design, which will improve control over discharges to Narrow Lake, and improve estimated TCA water quality. The revised TCA design calls for:

- sub-aqueous disposal of the leach tailings to avoid oxidation and acid generation, and
- No planned routine TCA discharge allowing interception and holding of the effluent if necessary.

As described in Section 3.0 of this report, a new site wide water balance based on the modified mine plan has been prepared. Although the process water balance indicates that there are no expected discharges from the facility to off-site water bodies, Tyhee NWT Corp. (Tyhee) expects that there will be a need to discharge TCA water to the receiving environment during the term of the projects water license and would expect to have the capability to do so in the terms and conditions of the initial operations water license issued by the Mackenzie Valley Land and Water Board (MVLWB) following the Regulatory Phase.

The geochemical characterization of tailings prepared by processing only Ormsby ore is described in Section 4.0. The data demonstrate that the absence of Nicholas Lake ore in the mill process generally improves water quality present in the TCA. The changes in TCA design also contribute to improving TCA water quality. The project is committed to meeting Metal Mining Effluent Regulations (MMER) standards in effluent and CCME water quality guidelines in receiving water bodies downstream of the mine should water be discharge from the TCA.

The estimated TCA water quality was based on the data developed during the characterization of the tailings material produced during the testing of the Ormsby ore. The primary source of the solutes in the TCA are from the supernatant from the flotation process which accounts for approximately 94 percent of the tailings and supernatant produced by the plant, and the detoxified supernatant from cyanide leaching of the concentrate which account for 6 percent of the liquid and solids entering the TCA.

The concentration of the a given solute in the TCA is a function of its concentration in the flotation supernatant, the detoxified leach supernatant, the amount of water reclaimed from the tailings pond, and the amount of makeup water. As no makeup water is used during the first four years of operation, the solute concentrations reach a maximum after the fourth year of operation. To show how the concentrations may evolve during the operation of the facility. Estimates of the concentration of arsenic, copper, cyanide, nickel, lead, and zinc in the TCA were prepared for the end of years 1, 4, 8, and 12 as shown below:

Estimated TCA Concentrations

			Year			
Parameter	**MMER (µg/L)**	**CCME (µg/L)**	**1 (µg/L)**	**4 (µg/L)**	**8 (µg/L)**	**12 (µg/L)**
As	500	5.0	10	59	15	8
Cu	300	2 - 4	50	208	75	35
CN	1000	5.0	100	144	100	50
Ni	500	25 - 150	0.8	3.3	1.2	0.5
Pb	200	1 - 7	3	14	4	2
Zn	500	30	0.7	2.9	1	0.8

The solute concentrations in the TCA meet the discharge limits imposed by MMER for the six parameters evaluated. However, the estimated concentrations cyanide and copper in Narrow Lake are potentially greater than the concentration guidelines for Canadian Environmental Quality Guidelines (CCME). The assimilative capacity of Narrow Lake to attenuate the assumed discharge of 100,000 m^3 over 30 days was evaluated. The results of this evaluation are presented below:

Equilibrium Concentration in Narrow Lake

			Year			
Parameter	**MMER (µg/L)**	**CCME (µg/L)**	**1 (µg/L)**	**4 (µg/L)**	**8 (µg/L)**	**12 (µg/L)**
As	500	5.0	0.8	4.8	1.2	0.6
Cu	300	2 - 4	4	17	6	2.8
CN	1000	5.0	8	11.5	8	4
Ni	500	25 - 150	*	*	*	*
Pb	200	1 - 7	0.2	1.1	0.3	0.2
Zn	500	30	*	*	*	*

Note:

*Concentration in the TCA is below CEQG guidelines so additional evaluation was not necessary.

The copper concentration in the TCA supernatant that could be discharged to Narrow Lake is estimated to be less than the MMER criteria. However, the estimated resulting concentration of copper in Narrow Lake for the assumed discharge is greater than the CCME guidance concentrations. Although the new water balance indicates that no discharge from the TCA to the downstream environment is expected during operation, Tyhee plans on discharging TCA supernatant to the downstream environment during the expected term of the initial water license issued by the MVLWB following the Regulatory Phase. With specific reference to copper concentrations within the TCA, these would be monitored during operation as part of the water license SNP and the effects of these concentrations on Narrow Lake, including confirmation of water in Narrow Lake meeting CCME guidelines, would be evaluated prior to discharge.

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Section 1.0 - Introduction

1.1 Description

Knight Piésold and Co. (Knight Piésold) has been asked to develop a site wide water balance model and address the geochemical tailings characterization for the Tyhee NWT Corp. (Tyhee) Yellowknife Gold Project (YGP). The Yellowknife Gold Project is located 90 kilometers (km) north of the City of Yellowknife in the South MacKenzie Mining District of the Northwest Territories. The Ormsby deposit, in the central portion of the YGP, contains an exploration decline last utilized in 2006, and an ore stockpile and a waste rock stockpile in the vicinity of the decline The ore and waste rock stockpiles are comprised of mineralized amphibolite (MA) and unmineralized amphibolite (UA). While surface exploration continues, underground excavations have not changed since 2006; therefore, waste rock and ore stockpiles have not changed in size or composition.

Since the submission of the Developer's Assessment Report (DAR), there have been changes in the mine plan. While the mining plan in the DAR includes the Ormsby deposit and the Nicholas Lake deposit, the current mine plan for permitting includes only the Ormsby deposit. In addition, the proposed waste rock facilities have been relocated to the areas between Narrow and Winter Lakes and the Discovery Mine Tailings cap, and the concept for the proposed Tailings Containment Area (TCA) has been revised to better handle the expected process streams from the YGP mill.

Acid base accounting (ABA), net acid generation (NAG), synthetic precipitation leaching procedure (SPLP), and supernatant analyses have been completed on six composite flotation tailings and six composite detoxed tailings samples. Current results will be discussed in comparison to the Canadian Environmental Quality Guidelines for the Protection of Aquatic Life (CCME-AL) (CCME, 2007) and the Metal Mining Effluent Regulations (MMER) (DFO, 2012) criteria.

1.2 Limitation and Disclaimer

This report titled *Yellowknife Gold Project Site Wide Water Balance and Geochemistry,* has been prepared by Knight Piésold for the exclusive use of Tyhee. No other party is an intended beneficiary of this report or the information, opinions, and conclusions contained herein. Any use by any party other than Tyhee of any of the information, opinions, or conclusions is the sole responsibility of said party. The use of this report shall be at the sole risk of the user regardless of any fault or negligence of Tyhee or Knight Piésold. The information and analyses contained herein have been completed to a level of detail commensurate with the objectives of the assignment and in light of the information made available to Knight Piésold at the time of preparation. Calculations have been checked and verified for reasonableness, and the content of the report has been reviewed for completeness, accuracy, and appropriateness of conclusions. To the best of the information and belief of Knight Piésold, the information presented in this report is accurate to within the limitations specified herein.

This report is Knight Piésold pdf file: *SiteWideWaterBalGeo_Rev0.pdf.* Any reproductions or modifications of this report are uncontrolled and may not be the most recent revision.

1.3 Contributors and Contacts

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Section 2.0 - Background

2.1 Project Description

The Yellowknife Gold Project is located 90 kilometers (km) north of the City of Yellowknife in the South MacKenzie Mining District of the Northwest Territories. Since the submission of the DAR, there have been changes in the mine plan. While the mining plan in the DAR includes the Ormsby deposit and the Nicholas Lake deposit, the current mine plan for permitting includes only the Ormsby deposit. In addition, the proposed waste rock facilities have been relocated, and the concept for the proposed Tailings Containment Area (TCA) has been altered.

2.2 Ore Mineralogy

Rocks for the Yellowknife Supergroup underlie the Discovery Property, which consists of two large metabasaltic bodies surrounded by predominantly metasedimentay rocks. Three rocks units are present on the Discovery Property:

- The Burwash Formation composed of metamorphosed sandstone and siltstone turbidities,
- The Transition Unit composed of metamorphosed sandstone, siltstone, (now graphitic) mudstone, and volcanic components, and,
- Amphibolite composed of pillowed, brecciated, and massive metabasalt.

The amphibolite and Transition units are interpreted as occurring collectively within the Banting Group based on rock associations and U-Pb age. One of the amphibolite bodies is termed the Ormsby Member, and hosts Ormsby gold mineralization. It contains a significant brecciated or fragmental component. The derivation of the breccia as primary or secondary effect is not resolved. It does appear to be controlling feature on the distribution of the gold mineralization.

The more northerly amphibolitic body contains pillows, more limited breccias or fragmentals and is referred to as the Discovery Member.

All the rocks are deformed and metamorphosed at greenschits to amphibolite facies conditions. Nonetheless, their protoliths are recognizable based on preserved textures. Four generations of ductile deformation are preserved on the property, exposed as near vertical dipping foliations, folds and a composite lineation. Retrograde metamorphism and gold mineralization overprint ductile deformation. Faulting and joining are the youngest observed deformation on the property. The metabasalt bodies are more competent and susceptible to brittle deformation and extensional veining than the surrounding metasedimentary rocks (Tyhee, 211).

2.3 Ore Processing

Tyhee ore will be ground and gold bearing material will be separated by froth flotation. This process will concentrate the gold into approximately 6 percent of the original ore by mass for cyanide leaching, while the remaining 94 percent will be sent to the TCA as flotation tailings without cyanide leaching.

The barren leached concentrate slurry, consisting of approximately 6 percent of the total mill throughput processed will flow to a process thickener. This device will remove much of the cyanide solution from the slurry for reuse in the process. The thickened tailings slurry will then be treated by the sulfur dioxide (SO_2)-Air process to reduce the remaining cyanide.

This flotation tailings slurry will be thickened to approximately 55 percent solids in another process thickener. As discussed in Section 2.5.3, the TCA design currently being considered will deposit flotation tailings to the north and south, and cyanide leach concentrate tailings will be sub-aqueous deposited in the center portion of the berm-divided TCA. The water associated with the floatation tailings discharged to the north and south cells of the TCA will preferential collect in the central area where the detoxified cyanide leach tailings are deposited. Mixing of the flotation tailings water, which will be approximately ten times the volume of leach concentrate tailings water, with the water from the cyanide destruction circuit will produce a cyanide concentration less than 0.1 milligrams per liter (mg/L) total cyanide in the TCA which is below the MMER cyanide standard of 1 mg/L total cyanide.

Natural attenuation within the TCA is expected to further reduce TCA concentrations. TCA discharge will mix with meteoric external water, reducing cyanide concentrations even further. Based on the site water balance, no discharge from the TCA is required. Should a discharge be needed, it will be of limited rate and duration

The TCA supernatant testing on flotation tailings had a pH of 7.99, indicating that the waters in contact with flotation tailings is likely to be approximately pH 8. That process water will mix to some degree, with local runoff waters. The average pH measurements in Round, Winter, and Narrow Lakes were 7.43, 7.03, and 7.03, respectively, based on monitoring from 2004 through 2010 for water license MV2002L2-0017. If pH in the TCA is maintained below a pH of 8, which is achievable through pH adjustment before discharge if necessary, more than 90 percent of the cyanide anion (CN-) present will be present as hydrogen cyanide (HCN) (Logsdon et al., 1999, available online).

2.4 Cyanide Destruction Circuit

A SO_2-Air cyanide destruction circuit (commonly referred to as the INCO process) will be used to reduce cyanide concentrations to MMER required concentrations before discharge to the TCA. The INCO process is based upon conversion of free and weak and dissociable (WAD) cyanides to cyanate using a mixture of SO_2 and air in the presence of a soluble copper catalyst at a controlled pH. In the INCO process, the forms of cyanide are removed by different processes. One process involves the conversion of free and WAD cyanides to cyanate. Iron complexed cyanides are reduced to the ferrous state and precipitated as insoluble copper-iron-cyanide complexes. Residual metals liberated from the WAD cyanide complexes are precipitated as their hydroxides.

The INCO process has been used at over 80 mining operations worldwide and is the process addressed in this section. A primary application of the sulfur dioxide and air process is in treatment of tailings slurries, but it is also effective for the treatment of solutions for the oxidation of free and WAD cyanides. The process has a track record of being able of reducing total cyanide in leach effluents to less than 1 mg per liter (Mudder et.al, no date). Examples include Lac Mineral's Colosseum (0.4 mg/L), Westmin's Premier Gold (< 0.2 mg/L), and Homestake Chevron's Golden Bear (0.3 mg/L).

Free and weakly complexed metal cyanides (i.e., WAD cyanides) are oxidized to cyanate by sulfur dioxide and air in the presence of a soluble copper catalyst.

$$CN^- + SO_2 + O_2 + H_2O \ \textit{Cu Catalyst} \ = \ OCN- + SO_4^{-2} + 2H^+$$

$$M(CN)_4^{-2} + 4SO_2 + 4O_2 + 4H_2O \ \textit{Cu Catalyst} \ = \ 4OCN^- + 8H^+ + 4SO_4^{-2} + M^{+2}$$

The reaction is normally carried out at a pH of about 8.0 to 9.0, and due to the formation of acid in the reactions, lime is normally required for pH control. Decreases in process performance can occur if the pH fluctuates outside this optimal range. The optimal pH must be determined experimentally, since maximum cyanide and metals removals occur at different pH values.

Temperature has little effect on process performance between 5°C and 60°C. The SO_2 required in the reaction can be supplied either as liquid sulphur dioxide, sodium sulphite (Na_2SO_3) or as sodium metabisulphite ($Na_2S_2O_5$).

Trace metals remaining in solution following oxidation of the weakly complexed metal cyanides are precipitated as their hydroxides according to the following generalized reaction:

$M^{+2} + 2OH^{-} = M(OH)_2$ (solid)

Metallurgical work has been conducted to determine the reagent usage in the beneficiation process for Ormsby ore. Initial testing of the cyanide destruction circuit using the INCO process has been completed.

2.5 Tailings Containment Area

2.5.1 TCA Description

The TCA has been designed on the basis of subsurface conditions encountered at site, potential fill materials on-site, water and tailing storage requirements, and the understood waste characteristics and physicals characteristics of the proposed tailing streams.

The design concept proposes using a portion of the existing Winter Lake basin for the TCA. The lake will be cut-off to allow dewatering of the northern portion of the lake which would otherwise impact the pit mining operation. These waters will be temporarily stored within the TCA and used as process water during the first several years of operations. The southern portion of Winter Lake, and a portion of the contributing basin area, will be used for tailings containment by the construction of perimeter dams. The proposed build-out of this facility is shown on Figure 2.1.

2.5.2 TCA Overview

The TCA will be subdivided into three distinct zones described as the northern, central, and southern cells. The design concept is to deposit the flotation tailing within the northern and southern cell to create a beach such that the decant pond will predominantly be located within the western section of the central cell. Likewise, flotation tailing will be deposited in the eastern portion of the central cell to push the pond to the western side of this cell. The carbon in leach (CIL) tailing will be deposited subaqueously within the decant pond in the central cell.

The embankments next to which the decant pond will be located throughout the life of the facility will be zoned structures with a low permeability core and downstream filter/drain. This zonation will extend to the elevation corresponding to a tailings elevation at which time the decant pond is moved sufficiently away from the embankments. For example, the main embankment in the northern reach of the TCA will be zoned due to the existing Winter Lake waters being placed within the TCA and the decant pond being in direct contact with the upstream face of this embankment during early stages of operations. Likewise, a portion of the southern dam will be zoned to retain the decant pond during early years of deposition. Also, the embankments on the western ridge between the TCA and the southern waste rock facility will be zoned over their entire height due to the decant pond being located adjacent to these structures late in the mine life, during closure, and after reclamation.

Exterior embankments which will not be located adjacent to the decant pond will be constructed of rockfill. It is assumed that these embankments will be sufficiently far from the decant pond at any time and potential seepage through these embankments will be managed by collection in sumps and returned to the active decant pond within the TCA. Similarly, the divider berms separating the northern, central, and southern cells will be constructed of rockfill such that waters can freely pass between the cells, mixing the waters from each, and locating the decant pond in the western portion of the central cell.

Decant waters will be reclaimed and returned for recycle in the process plant to reduce the requirement for make-up water to be obtained from Giauque Lake. However, during later phases of the project, additional water will need to be drawn from Giauque Lake as the decant pond volume will reduce due to the overall site water balance operating in a net deficit condition over the life of the project. The results from the water balance are described in Section 3.

2.5.3 TCA Operation

The original TCA design contained in the DAR called for co-deposited flotation and leach concentrate tailings. Potential acid generating leach concentrate tailings would be deposited with flotation tailings throughout the TCA. The conceptual TCA design embankments were to be comprised of homogenous rockfill, which were thought to self-plug due to tailings becoming entrenched within the pore space of the rockfill due to filtration of the tailings into the embankment over time. Knight Piésold considered that there was a risk that the rockfill embankment would not self-plug resulting in discharge of untreated tailings to the downstream environment. For this reason, and to reduce the oxygen exposure of leach concentrate tailings, the TCA design has been updated for the current Feasibility Study.

The revised mine plan includes a TCA design in which the tailings are deposited in separate cells. Flotation tails are deposited in the southern and northern cells while the leached tailings are deposited subaqueously in a center cell mixed with a yet to be determined amount of flotation tailings. The northern and southern embankments are designed with rockfill upstream and downstream shells and a low-permeability core to limit leakage. The center cell will contain the leach concentrate tailings which will be deposited subaqueously to decrease the potential for oxidation. Interception or pump back sumps located downstream of the tailings embankments will collect and pump effluent back to the TCA or to an onsite treatment facility if necessary to meet water quality discharge criteria.

The revised mine plan and current TCA design allows for the interception, storage, and treatment, if necessary) of effluent which seeps through the TCA embankments and decreases the potential for oxidation of leach concentrate tailings. These design improvements mitigate the potential for acid generation, leading to a likely reduction in metals concentration, and decrease the likelihood for uncontrolled discharge to the surrounding environment.

2.5.4 Tailing Production and Material Descriptions

This section describes the physical characteristics of the tailing waste streams for placement within the TCA. The information was used to evaluate and develop the design of the storage facility. It should be noted that the current plant design, as developed by Tyhee and Lyntek, assumes that two equivalent, parallel circuits will be operating simultaneously each at 2,000 dry tonnes per day (dtpd), assuming 365 day/year, 24/hour per day production. Due to the remote access to the site, being only road accessible during the winter months, if a plant interruption occurs and a large piece of equipment needs to be replaced, one circuit of the plant can remain on-line until the site is accessible via the winter road for delivery.

2.5.4.1 Flotation Tailing

Flotation tailing will be produced at a constant rate over the project life as defined by the Plant designer (Lyntek). For the purposes of the TCA design, Tyhee requested that Knight Piésold consider flotation tailing being produced at a rate of 4,174 dtpd, 336 days/year (3,760 dtpd on a 365 day/year basis,) over the life of the project, approximately 94 percent of all tailings produced at the plant. The flotation circuit will operate on a 24-hour/day basis and has an assumed availability of 92 percent over the life of the project. This availability defines the 336 day/year operation. This production corresponds to approximately 14.1 million dry tonnes of flotation tailings to be stored within the TCA over the life of the facility. Flotation tailing will exit the plant thickener as a slurry with an approximate 55 percent solids content and pumped to the TCA for storage.

Geotechnical laboratory test work indicates that the flotation tailing stream classifies as a Sandy Silt (ML) according to the Unified Soil Classification System (USCS). This material has 64 percent passing the No. 200 sieve with approximately 3 percent of the overall mass being clay-sized particles. This material has a liquid limit of 18 and has no plastic limit; therefore, classifying as non-plastic. The specific gravity of the solids was estimated to be 3.02. Specialized consolidation testing (Seepage Induced Consolidation [SIC]

Testing) was performed to characterize the compressibility and hydraulic conductivity of the tailing with respect to the void ratio and, therefore, confining stresses expected within the tailing mass. The results of this testing was used to estimate tailings densities expected in the facility over the life of the project.

From this laboratory testing, subsequent consolidation modeling, and an assumed approximately 10 percent reduction in density for the development of ice lensing, a dry density profile for the flotation tailing in the TCA has been developed. It is estimated that the dry density of the tailings slurry in the pipeline will be 0.82 tonnes per cubic meter (t/m^3) which will increase after deposition to a range between 1.2 to 1.4 t/m^3 dry density over the life of the TCA. With the estimated density profile and the depth-capacity curve developed for the TCA, storage capacities within the TCA and the corresponding embankment crest elevations were estimated.

2.5.5 CIL Tailing

CIL tailing will be produced at a constant rate over the project life as defined by Lyntek. For the purposes of the TCA design, Tyhee requested that Knight Piésold consider CIL tailing being produced at a rate of 261 dtpd, 336 days/year (240 dtpd on a 365 day/year basis) over the life of the project, approximately 6 percent of all tailings produced at the plant. The CIL circuit will operate on a 24 hour/day basis and has an assumed availability of 92 percent over the life of the project. This production corresponds to approximately 0.9 million dry tonnes of CIL tailings to be stored within the TCA. CIL tailing will exit the CIL circuit as a slurry with an approximate 35 percent solids content, held in a tank with approximately 12 hours of storage, and pumped to the TCA in two daily discharge periods.

CIL tailings were not provided to Knight Piésold for geotechnical laboratory testing. However, due to the relatively limited amount of CIL tailing being produced over the life of the mine, it was assumed that the physical characteristics of the flotation tailing would dominate the design of the TCA.

Section 3.0 - Site Wide Water Balance

Knight Piésold and Co. (Knight Piésold) has completed the site-wide water balance to support the feasibility study of the Yellowknife Project using the proposed process and mine plans. This water balance was performed for the entire site including the TCA, waste rock facilities (WRFs), stockpile facility, Run of Mine (ROM) facility, Ormsby open pit, and plant. The water extracted from the dewatering wells for the Ormsby pit will be discharged to surface water and was not included in the site-wide water balance analyses. To date, no water balance analyses have been performed for the reclamation period.

The water balance performs monthly hydraulic and hydrologic calculations based on the various input data (including climate data, process schematics, and facility expansion details). The operational and process data were supplied by Tyhee and facility layout details were developed to simulate the operation. In addition, a climate data analysis was performed for the site.

For this level of study, the climate data analysis was performed using climate data from the on-site station, Tyhee Station, and a near-site station, Yellowknife Airport Station. The following information was developed for the site from this study:

- Average annual precipitation for the site is 247.1 millimeters (mm).
- Maximum monthly 100-year/24-hour storm occurs in August and is 62.1 mm.
- Average maximum temperature for the site ranges from -24.4 to 20.3 degrees Celsius (°C) with an average annual maximum value of -1.5 °C.
- Average minimum temperature for the site ranges from -32.3 to 10.6°C with an average annual maximum value of -10.5 °C.
- Average annual potential evaporation is 622 mm.
- Average annual evaporation from existing ground is 104 mm.
- Average annual evaporation from the ROM, Stockpile, and WRFs is 68 mm.
- Average annual evaporation from dry tailing is 145 mm.
- Average annual evaporation from wet tailing is 560 mm.
- Average annual evaporation from pond surfaces is 373 mm.
- Average annual evaporation from within the open pit is 137 mm.

Although reasonable estimates of the site precipitation, temperature, and evaporation were made for this study, it is recommended that as the project advances, other climatological stations in the area be reviewed to evaluate if other trends/relationships exist in the area, and the currently developed climatological data should be reviewed.

Water that will be collected from several facilities within the project area will be directed to the TCA for temporary storage and use in the process. Although the process water balance indicates that there are no expected discharges from the facility to off-site water bodies, Tyhee expects that there will be a need to discharge TCA water to the receiving environment during the term of the projects water license and would expect to have the capability to do so in the terms and conditions of the initial operations water license issued by the MVLWB following the Regulatory Phase. These facilities include the ROM facility, Stockpile facility, WRFs (west and north), and the Ormsby open pit. The estimated flows predicted to be sent to the TCA from these facilities are approximately:

- The ROM facility will send 0 to 1.5 cubic meters per hour (m^3/h) to the TCA for temporary storage and then use in the process.

- The Stockpile facility will send 0 to 21 m^3/h to the TCA for temporary storage and then use in the process.
- The West WRF will send 0 to 40 m^3/h to the TCA for temporary storage and then use in the process.
- The North WRF will send 0 to 20 m^3/h to the TCA for temporary storage and then use in the process.
- The Ormsby open pit will send 0 to 28 m^3/h to the TCA for temporary storage and then use in the process.

Since there is no plan to discharge water that has come in contact with site waste materials, stormwater captured in the above listed facilities will be collected in impoundments designed to handle average flows plus the 100-year/24-hour storm volume. The collected stormwater will be delivered to the TCA and used in the process.

Based on the latest mine plan, the TCA will start to receive tailings in July 2015. Operations will terminate in December 2026. The TCA will be constructed in and around the existing Winter Lake. Winter Lake has a total volume of roughly 1.4 million m^3 of water and this water will be used for startup of the mill and makeup water for a long as water remains in the facility.

Based on this operational philosophy, the TCA pond volumes were estimated throughout the life of the project where the initial pond volume is that of Winter Lake, 1.4 million m^3. As the operations continue, the pond volume is continually decreasing as the water from Winter Lake is used to make up the process water shortfall for operations. For average climatologic conditions, the pond volume ranges from 300,000 to 1.4 million cubic meters (m^3) for the life of the project.

Due to the location of the project, during the winter months, the pond is expected to freeze. Therefore, analyses were performed to estimate the depth of ice in the pond for the life of the project since when portions of the pond are frozen, this water cannot be reclaimed. When the frozen pond volumes are compared with the total pond volumes, at times, especially after the first few years of operation, a significant portion of the pond volume (up to 90 percent of the total volume) is frozen in the winter months.

Using the available pond volume information (less the frozen portion) as well as the process requirements, the amounts of water that can be sent to the plant from the TCA were calculated. Based on these results, the volume of water that exists in Winter Lake is sufficient (with the additional inflows from the ancillary facilities and precipitation) to sustain operations from July 2015 through January 2020 for average climatological conditions. After January 2020, mainly in the winter months when the TCA pond is frozen, additional makeup is required to sustain operations. Makeup requirements are predicted to increase with time as the volume of water in the TCA pond continues to drop. Based on the production rate, tailing density and percent solids, the total flow required to sustain operations is 143 m^3/h which is met in the first 5.5 years of operation. After that, there is not sufficient water in the TCA pond to meet this requirement. For average climatological conditions, in 2021, approximately 22,500 m^3 of additional water is required to sustain operations, in 2023 it is 253,500 m^3 and in 2026 it is 544,500 m^3.

To ensure sufficient storage exists within the TCA pond for operational water as well as storm water, storm event modeling of the facility was performed. Two storm event modeling approaches were performed: (1) average pond volume plus the 100-yr/24h storm event, and (2) probabilistic modeling for the 1 percent chance of exceedance pond volume. The results of these analyses will allow the staged embankment elevations to be determined such that overtopping of the facility does not occur.

Section 4.0 - Characterization Program

4.1 Sampling

The original mine plan presented in the DAR involved using ore from both the Nicholas Lake and Ormsby deposits. Tailings from both deposits would have been placed in the TCA. However, the mine plan currently being permitted excludes ore from the Nicholas Lake deposit. Tailings generated during the metallurgical testing of only the ore from the Ormsby deposit were subjected to geochemical characterization. The material tested included a master composite sample subjected to lock cycle testing on six variability composite samples to evaluate the range of possible materials to be processed. Each sample was first processed through a flotation circuit to recovery the sulphides to generate the flotation tailings. The concentrate was then treated with a cyanide leach to recovery the gold and to generate the leach tailings. The leach tailings were subjected to a cyanide destruction process prior to geochemical testing. A supernatant sample from the master composite flotation tailings was used for whole effluent toxicity testing.

4.2 Cyanide Destruction Testing

The cyanide destruction tests were conducted on CIL leach residues from testing of the Ormsby deposit ores. The INCO air/SO_2 cyanide destruction was tested in batch mode on the batch mode on the six variability composite sample. The process was simulated in a continuous mode on the master composite. An overall target of <1 parts per million (ppm) of total CN in the effluent was arbitrarily set. Standard Free-CN titrations were performed to follow progress at regular intervals.

4.3 Cyanide Destruction Results

The mining industry, regulators, and most service laboratories generally use the following guidelines for cyanide species.

- ***Free Cyanide (CN_F)*** Only hydrogen cyanide and the cyanide ion in solution can be classed as “free” cyanide. The proportions of HCN and CN^- in solution are according to their equilibrium equation; this is influenced by the solution pH.
- ***Weak Acid Dissociable Cyanide (CN_{WAD})*** Unlike the definition of “free cyanide” which identifies the specific cyanide species being measured, WAD cyanide refers to those cyanide species measured by specific analytical techniques. WAD cyanide includes those cyanide species liberated at moderate pH of 4.5 such as HCN(aq) and CN^-, the majority of Cu, Cd, Ni, Zn, Ag complexes and others with similar low dissociation constants.
- ***Total Cyanide (CN_T)*** This measurement of cyanide includes all free cyanide, all dissociable cyanide complexes and all strong metal cyanide including ferro-cyanide $Fe(CN)_6^{-4}$, ferri-cyanide $Fe(CN)_6^{-3}$, and portions of hexacyano cobaltate $Co(CN)_6^{-3}$ and those of gold and platinum. Only the related or derived compounds cyanate (CNO^-) and thiocyanate (SCN^-) are excluded from the definition of total cyanide.

The analytical testing for the cyanide destruct evaluation includes the analysis of all three species. The laboratory test reports are included in Appendix A and are summarized on Table 4.1. The leach tailings represent approximately 6 percent of the total tailings material.

The residual total cyanide after the destruct process ranged from <0.05 mg/L for sample DT-6 to 6.43 mg/L for DT-2. The final total CN concentrations for samples DT-3 through DT-6 were all below 1 mg/L. The final total CN concentration for DT-1, the continuous test system, was 2.88 mg/L.

4.4 Geochemical Testing

The data is discussed in comparison with the CCME-AL (CCME, 2007) and the MMER (DFO, 2012) criteria (Table 4.2).

4.4.1 Whole Rock Analysis

The whole rock analysis provides an indication of those metals with concentrations high enough in the materials to result in elevated leachate concentrations. For the purpose of this investigation, concentrations of trace metals five times greater than the average for a given rock type (Turekian and Wedepohl, 1961) in the whole rock digestion of the tailings were identified as potentially available to be leached.

4.4.2 Paste pH

Values obtained from paste pH testing indicate whether a sample contains readily available acidity or alkalinity. A paste pH greater than 7 indicates the presence of reactive carbonate. A paste pH less than 5 suggests that the material contains acidity from prior acid generation

4.4.3 Acid Base Accounting

Static ABA testing aimed to characterize the relative acid-generating and acid-neutralizing potential of mine waste materials. Estimations of these quantities are determined from measurements of total sulphur and various sulphur species.

Acid base accounting is a general testing program which indicates whether or not a sample is likely to produce acid upon weathering. ABA is calculated from carbonate concentration and sulphur species concentrations, where sulphide sulphur is acid producing and carbonate is acid neutralizing. As part of the ABA testing program, the Acid Generation Potential (AGP) is calculated based on sulphide sulphur (HNO_3 extractable sulphur) and the Neutralization Potential (NP) is based on the results from the modified Sobek method–MSU Reclamation Research Unit (EPA-600/2-78-054). The AGP and the NP are used to calculate the Net Neutralization Potential (NNP) and the Neutralization Potential Ratio (NPR). The NNP is the difference between NP and the AGP, while the NPR is NP divided by AGP. In general, a sample is considered non-acid generating (non-PAG) if the NNP is greater than 20 kg $CaCO_3$/tonne, and the NPR is greater than 3. Samples with NNP <20 kg $CaCO_3$/tonne but >0 kg $CaCO_3$/tonne and NPR between 1 and 3 are classified as having uncertain acid generating potential (UN). Those with NNP <0 kg $CaCO_3$/tonne and NPR <1 are considered potentially acid generating (PAG).

An additional measurement determined from ABA data is paste pH. Values obtained from paste pH testing indicate whether a sample contains available acidity or alkalinity. A paste pH greater than 7 indicates the presence of reactive carbonate. A paste pH less than 5 suggests that the material contains acidity from prior acid generation.

4.4.4 Net Acid Generation

NAG testing aggressively oxidizes a sample through the utilization of hydrogen peroxide (H_2O_2). The purpose of this particular static test is to suggest a worst-case scenario evaluation of pyrite oxidation and mass loading. However, as it is a static test, NAG testing does not provide an indication of the time required before a sample begins acid production.

Net acid generation pH indicates the potential for samples to generate acid upon leaching. If NAG pH is <4.5, the material is likely to generate acid over the long term (American Journal of Applied Science, 2010). The metals most likely to be of concern are based on a screening evaluation using the concentration of metals released by complete oxidation in the NAG test. The results provide a preliminary indication of potential metals of concern.

To determine the NAG, 2.5 grams of sample is combined with 250 milliliters of 15 percent H_2O_2 solution and allowed to react for 24 hours. The solution is then boiled until effervescing ceases or for a minimum of 2 hours. Sufficient deionized water is added to the solution to return the sample to the original weight. If the final solution pH is less than 4.5, the material is typically classified as PAG. The solution is typically titrated to pH 4 and pH 7 with 0.1 moles per Liter (mol/L) sodium hydroxide (NaOH) solution.

4.4.5 Synthetic Precipitation Leaching Procedures (SPLP)

The SPLP test is used to assess the waste rock potential to release chemicals to the surrounding environment by simulating interaction between water and solids.

To perform an SPLP extraction, a sample is combined with deionized water in a solid:liquid ratio of 1:20 (i.e., 50-g solid sample and 1,000 milliliter of slightly acidified deionized water [pH ~6.5]). The sample is turned in a rotary extractor for approximately 18 hours. Following the extraction time, the liquid was separated from the solid phase by filtration, and analyzed for dissolved metals by ICP-MS.

4.5 Geochemical Results

Laboratory results from the static testing of the tailings are available in Appendix B. Discussion of these results is presented in the following subsections.

4.5.1 Whole Rock

A total of 12 tailings composites samples (6 flotation tailings and 6 detoxed tailings) from the Ormsby deposit were subjected to whole rock analysis, including total sulphur, sulphide sulphur, and sulphate.

4.5.1.1 Flotation Tailings

The results of the whole rock analysis for the six composite floatation tailings are presented in Table 4.3. Sulfate, arsenic, cadmium, chromium, and molybdenum, have concentrations five times greater than the average for a given rock. Therefore, are identified as potentially available to be leached.

4.5.1.2 Detoxed Tailings

The results of the whole rock analysis for the six composite detoxed tailings are presented in Table 4.4. Sulfate, arsenic, cadmium, chromium, copper, iron, molybdenum, nickel, lead, and zinc have concentrations five times greater than the average for a given rock. Therefore, are identified as potentially available to be leached.

4.5.2 Acid Base Accounting and Paste pH

A total of 12 tailings composites samples (6 flotation tailings and 6 detoxed tailings) from the Ormsby deposit were subjected to ABA evaluation, including paste pH.

4.5.2.1 Flotation Tailings

Paste pH of the six flotation samples ranged from 7.8 to 8.4 and the total sulphur ranged from 0.08 percent to 0.16 percent. The flotation tailings ABA results (Table 4.5) indicate four samples (OM-105, OM-417, OM-559, and OM-723), are non-potentially acid generating with NNPs ranging from 19.7 to 36.6 kg $CaCO_3$/tonne and NPRs ranging from 8.34 to 16.02. The other two samples (OM-Master and Bruce Zone) are classified as uncertain acid generating with NNPs of 17.2 and 16.4 kg $CaCO_3$/tonne and NPRs of 5.38 and 10.18, respectively.

4.5.2.2 Detoxed Tailings

Paste pH of the detoxed samples ranged from 7.3 to 8.7 and the total sulphur ranged from 6.5 percent to 24.9 percent. The detoxed tailings ABA results (Table 4.5) indicate that all six samples are potentially acid generating with NNPs ranging from -148.4 to -729.5 kg $CaCO_3$/tonne and NPRs ranging from 0.03 to 0.11.

4.5.3 Net Acid Generation

A total of 12 tailings composites samples (6 flotation tailings and 6 detoxed tailings) from the Ormsby deposit were subjected to NAG pH and NAG leachate testing.

4.5.3.1 Flotation Tailings

Net acid generation pH for the six flotation samples ranged from 7.5 to 8.3 and all samples are considered non-PAG based on the criteria stated in Section 4.1.4 (Table 4.6).

Net acid generation extract results (Table 4.7 and Figure 4.1) for the six flotation samples indicate that all constituents of potential interest (COPIs) are below the Maximum Average Concentration of the MMER criteria. Constituents of potential interest that have concentrations above the CCME criteria are free cyanide, silver, aluminum, arsenic, cadmium, chromium, copper, iron, mercury, lead and selenium. Concentrations of all other metals are below the CCME limits.

The method detection limits for cadmium, selenium, and free cyanide are higher than the CCME guidelines. Therefore, although some samples are below the lab detection limit does not assure that the CCME guidelines are met.

4.5.3.2 Detoxed Tailings

Net acid generation pH for the six detoxed samples ranged from 2.0 to 2.6 and all samples are considered PAG based on the criteria stated in Section 4.1.4 (Table 4.6).

Net acid generation extract results (Table 4.8 and Figure 4.1) for the six detoxed samples indicate that arsenic, copper, nickel, lead, and zinc have concentrations above the Maximum Average Concentration of the MMER criteria. Constituents of potential interest that have concentrations above the CCME criteria are free cyanide, silver, aluminum, arsenic, cadmium, chromium, copper, iron, mercury, nickel, lead, selenium, and zinc. Concentrations of all other metals are below the CCME and MMER limits.

The method detection limits for cadmium, selenium, and free cyanide are higher than the CCME guidelines. Therefore, although some samples are below the lab detection limit does not assure that the CCME guidelines are met.

4.5.4 Synthetic Precipitation Leaching Procedure

A total of three tailings composites samples (two flotation tailings and one detoxed tailings) from the Ormsby deposit were subjected to SPLP.

4.5.4.1 Flotation Tailings

The SPLP analytical results are summarized in Table 4.9 and Figure 4.2 and indicate that all COPIs are below the Maximum Average Concentration of the MMER criteria. The pH results for the two flotation tailings samples are 8.8 and 9.1. Sample Bruce Zone composite tailing pH is slightly above the CCME guidelines. COPIs with concentrations above the CCME guidelines are silver, aluminum, arsenic, cadmium, copper, iron, mercury, selenium, and zinc. Concentrations of all other metals are below the CCME guidelines.

4.5.4.2 Detoxed Tailings

The SPLP analytical results are summarized in Table 4.9 and Figure 4.2 and indicate that all COPIs are below the Maximum Average Concentration of the MMER criteria. The pH result for the detoxed tailings sample is 8.3. COPIs with concentrations above the CCME guidelines are aluminum, cadmium, copper, mercury, and selenium. Concentrations of all other metals are below the CCME guidelines.

4.5.5 Tailings Supernatant

A total of 12 tailings composites samples (6 flotation tailings and 6 detoxed tailings) from the Ormsby deposit were analyzed for dissolved metals, anions, pH, alkalinity, and sulphate.

4.5.5.1 Flotation Tailings

The supernatant results for the six flotation tailings samples are presented in Table 4.10 and Figure 4.3 and indicate that all COPIs are below the Maximum Average Concentration of the MMER criteria, except for total suspended solids (TSS). Results show that the constituents of interest with concentrations greater than the CCME are free cyanide, silver, aluminum, arsenic, cadmium, chromium, iron, mercury, molybdenum, lead, and selenium. Concentrations of all other metals are below the CCME guidelines.

The method detection limits for cadmium, selenium, and free cyanide are higher than the CCME guidelines. Therefore, although some samples are below the lab detection limit does not assure that the CCME guidelines are met.

4.5.5.2 Detoxed Tailings

The supernatant results for the six detoxed tailings samples are presented in Table 4.11 and Figure 4.3. The results indicate that the concentrations of all COPIs are less than the Maximum Average Concentration of the MMER except for TSS, copper, and arsenic. Results show that the constituents of interest with concentrations greater than the CCME are free cyanide, silver, aluminum, arsenic, cadmium, chromium, copper, iron, mercury, molybdenum, nickel, lead, selenium, thallium, and zinc. Concentrations of all other metals are below the CCME guidelines.

The method detection limits for cadmium, selenium, and free cyanide are higher than the CCME guidelines. Therefore, although some samples are below the lab detection limit does not assure that the CCME guidelines are met.

4.6 Float Tailings Supernatant Toxicity Testing

Toxicity can be experimentally determined in the laboratory by exposing sensitive organisms (usually surrogate organisms representative of those found in the environment) to effluents using whole effluent toxicity (WET) tests. Responses assessed usually include survival, growth, and/or reproduction. This type of test can be used to evaluate the toxicity of effluents, storm water, or ambient surface waters. WET testing is used to assess and regulate the combined effects of all constituents of a complex effluent rather than the conventional methods of controlling the toxicity of single chemicals or constituents.

WET testing exposes laboratory populations of aquatic organisms such as fish, invertebrates, and algae to diluted and undiluted effluent samples under controlled conditions in order to estimate the environmental toxicity of that sample. The information is used to prevent the discharge of toxic amounts of pollutants to surface waters. The standardized procedures of WET tests allow one to determine the actual environmental exposure of aquatic life to an effluent or ambient water without knowledge of the chemical, physical, and biological characteristics of that discharge or ambient water.

A sample of the master composite float tailings supernatant, which had been left in contact with the tailings for 6 weeks to better approximate the conditions in the TCA, was subjected to WET testing. The sample was tested against Daphnia magna and Pimephales promelas (fathead minnow).

4.7 Float Tailings Supernatant Toxicity Testing Results

The laboratory results for the testing are presented in Appendix C. The results indicate a 100 percent survival rate for both organisms. These data are consistent with testing conducted on the combined Ormsby and Nicholas flotation tailings which reported 100 percent survival for a 48-hour test using Daphnia magna and 100 percent survival for a 72-hour test using rainbow trout.

Section 5.0 - Impact Analysis

5.1 TCA Water Quality Prediction

Most broadly, potential contaminants enter the TCA as solutes in the inflowing water (site surface water, makeup water, flotation, and leached tailings supernatant) and by leaching from tailings. The exchange of constituents entering and leaving the TCA is straightforward; i.e., flow rate x concentration = load rate. This applies to both inflows and outflows to either surface water or groundwater. Concentrations are then evaluated as mass per unit of liquid in the TCA

The sulfide minerals in tailings have the potential to oxidize if exposed to atmospheric oxygen. The resultant products of oxidation are sulfate, acidity, metals, and often other solutes. The operating plan for the TCA provides for the leach tailings, which contain the sulfide minerals, are covered by a sufficient depth of water to inhibit the ingress of oxygen and the resulting acidic conditions.

5.1.1 Operational Water Balance

The operational water balance presented in Section 3.0 was used as the basis for calculating the material loads to and from the TCA. The components of the water balance are shown on Figure 5.1. The initial state of the TCA is 1,400,000 m^3 of water pumped from Giauque Lake and contained in the south portion of Winter Lake that will become the TCA to provide water for the initial plant startup. As shown on Figure 5.2, the process water for the first four years of operation is a combination of the original 1,400,000 m^3 plus gains to the TCA from direct rainfall, runoff from the plant site drainage area, runoff collected from the waste rock and ore storage areas, and runoff entering the open pit mine that are pumped to the TCA. Losses from the TCA are evaporation and water entrained in the tailings. Water is reclaimed from the TCA, returned to the process plant and returns with the tailings. There is no groundwater outflow component as seepage from the TMF is collected below the TCA embankment and returned to the TCA.

After the fourth year of operation, it is necessary to add makeup water from Giauque Lake to continue processing operations as shown on Figure 5.3. The amount of makeup water added increases each year until it reaches the maximum of 143 m^3/h. The water balance indicates that there is no planned discharge of water from the TCA. However, discharges of limited quantities for short durations may become necessary because of unusual of unanticipated conditions.

5.1.2 Estimated TCA Water Quality

The estimated TCA water quality was based on the data developed during the characterization of the tailings material produced during the testing of the Ormsby ore. The primary source of the solutes in the TCA are from the supernatant from the flotation process which accounts for approximately 94 percent of the tailings and supernatant produced by the plant, and the detoxified supernatant from cyanide leaching of the concentrate which account for 6 percent of the liquid and solids entering the TCA.

The concentration of the a given solute in the TCA is a function of its concentration in the flotation supernatant, the detoxified leach supernatant, the amount of water reclaimed from the tailings pond, and the amount of makeup water. As no makeup water is used during the first 4 years of operation, the solute concentrations reach a maximum after the fourth year of operation. To show how the concentrations may evolve during the operation of the facility. Estimates of selected parameters were prepared for the end of years 1, 4, 8, and 12.

The fate and transport of arsenic, copper, cyanide, nickel, lead, and zinc were evaluated. These parameters were chosen because they are typical parameters of environmental interest and because there are numerical limits in the MMER for them.

Based on the calculations, the concentrations of the six parameters in the TCA, and therefore discharged to Narrow Lake, are shown for years 1, 4, 8, and 12 on Table 5.1. The calculations demonstrate that the anticipated concentrations of the critical solutes in the TCA supernatant solution are below the concentrations allowed for discharge by the MMER for the years considered.

5.1.3 Discharge Characteristics

As there is no planned discharge, a plausible discharge scenario was needed to evaluate the potential impact of the discharge on the receiving water body. The tailings discharge would need to be pumped from the TCA. The available pumps would be the reclaim pumps which have a capacity of approximately 140 m^3/hr. Based on the pond volumes shown on Figure 5.4, assuming a discharge duration of 30 days would result in the discharge of approximately 100,000 m^3 would be reasonable. Any discharge would only occur between May and October. The most likely time for a discharge would be in May or June.

5.2 Effects on Narrow Lake

Any discharge from the TCA would enter Narrow Lake. Narrow Lake hydrology data was taken from the water balance in Section 4.12.3 of the DAR. Narrow Lake has a drainage area of 3.8 km^2. Narrow Lake has two deep (>11 meters) basins that are isolated from the surface for much of the summer. The discharge from the TCA is applied at the north end of the lake, and runoff discharges are applied over the lake as a whole. The energetic wind-induced mixing in the lake effectively mixes the surface inflows regardless of their actual location, so the spatial distribution of runoff flows is not important to lake physics. The volume of precipitation runoff entering Narrow Lake to attenuate solute concentrations is appropriately represented by assuming the recharge is spread over the entire surface of the lake.

The solute concentrations in the TCA meet the discharge limits imposed by MMER for the six parameters evaluated. However, the concentrations of cyanide and copper are greater than the concentration guidelines for CCME. The assimilative capacity of Narrow Lake to attenuate the assumed discharge of 100,000 m^3 over 30 days was evaluated. The results of this evaluation are presented on Table 5-2 and further discussed below.

Arsenic

Arsenic speciation and concentrations in water are affected by chemical and microbiological oxidation, reduction, methylation, pH, and availability of complexing ions, such as sulphide, carbonate, and phosphate. Water concentrations can also be biotic uptake, sorption to iron precipitates, and sorption to clay particles and colloidal humic material. Arsenic can be present in the environment in organic and inorganic forms, and as arsenate, arsenite, arsenic, and arsine oxidation states. No attempt was made in this analysis to speciate the various forms.

Processing only Ormsby ores results in a significant reduction in the estimated arsenic content of the processing waste streams. The source for most of the arsenic in the TCA is the concentrate leach supernatant which accounts for about 6 percent of the total mass. The estimated arsenic concentration after year 1 is 10 µg/L. The arsenic concentration increases through year 4 to 59 µg/L as a result of reclaim from the tailings pond, additions from the ore during processing and limited addition of water from precipitation collected from the various site facilities. After the fourth year, the arsenic concentration decreases as greater quantities of water is added from Giauque Lake.

The equilibrium concentration of total arsenic in Narrow Lake resulting from the discharge of 140 m^3 for 30 days ranges from 0.8 µg/L based on the estimated TCA concentrations at the end of year 1 to 4.8 µg/L based on the estimated TCA concentrations at the end of year 4. These concentrations are below the 5 µg/L CCME guideline for arsenic. If the arsenic concentration is greater than 60 µg/L or the quantity discharged is greater than 100,000 m^3 over 30 days, exceedence of the 5 µg/L guideline could occur.

Copper

Dissolved copper may be present in various forms, ranging from cupric ion to various inorganic and organic complexes. The ionic form of copper is toxic at very low concentrations, but complexed copper is basically non-toxic. Copper speciation, which determines both bioavailability and toxicity, is a function of the pH, temperature, dissolved organic compounds, and concentrations of various inorganic cations and anions. (US EPA, 2007).

The copper concentration in the TCA supernatant that could be discharged to Narrow Lake is estimated to be less than the MMER criteria. However, the estimated resulting concentration of copper in Narrow Lake for the assumed discharge is greater than the CCME guidance concentrations. Although the new water balance indicates that no discharge from the TCA to the downstream environment is expected during operation, Tyhee plans on discharging TCA supernatant to the downstream environment during the expected term of the initial water license issued by the MVLWB following the Regulatory Phase. With specific reference to copper concentrations within the TCA, these would be monitored during operation as part of the water license SNP and the effects of these concentrations on Narrow Lake, including confirmation of water in Narrow Lake meeting CCME guidelines, would be evaluated prior to discharge.

Cyanide

Following the cyanide leaching of the flotation concentrate, most of the cyanide in the solution will be destroyed using the INCO process which is capable of producing cyanide concentrations below 1 mg/L. The limited testing of the INCO process on tailings supernatant from the leached tailings indicated a range in values. Although it is anticipated that cyanide concentrations during operation will be reduced to below 1 mg/L cyanide in the detoxed leached tailings solution, the results reported for test DT-1 were used for this evaluation. The estimated concentrations are for total cyanide in the TCA solution. The estimated concentrations in the tailings solution are all well below the concentration for discharge allowed by the MMER.

Cyanide levels in the TCA are likely to decline through natural attenuation which is known to reduce cyanide concentrations. The natural degradation of cyanide occurs principally through volatilization with subsequent transformations to less toxic chemical substances. Zagury et al (2003) studied the fate and natural attenuation of cyanide in mine tailings and found that reactive cyanide species naturally degraded within the tailings area due to volatilization, leaching, and bacterial degradation. Although the large surface area of the pond provides the opportunity for relatively rapid removal of dissolved cyanide, this process was not considered in this evaluation.

The CCME guidelines are based on free cyanide rather than total cyanide. The free cyanide is a component of the total cyanide and so would be some fraction of total cyanide calculated for Narrow Lake resulting from the example discharge. It is likely that the actual levels in Narrow Lake would be lower than those estimated here and would therefore not be harmful to aquatic life.

Lead, Zinc and Nickel

The estimated concentrations of lead, zinc and nickel are all well below both their MMER concentrations and CCME guidelines and do not pose a threat to the aquatic life in Narrow Lake.

Summary

Based on this analysis, the copper concentration in the TCA is the controlling parameter. . Although the new water balance indicates that no discharge from the TCA to the downstream environment is expected during operation, Tyhee plans on discharging TCA supernatant to the downstream environment during the expected term of the initial water license issued by the MVLWB following the Regulatory Phase. With specific reference to copper concentrations within the TCA, these would be monitored during operation as part of the water license SNP and the effects of these concentrations on Narrow Lake, including confirmation of water in Narrow Lake meeting CCME guidelines, would be evaluated prior to discharge.

Section 6.0 - Conclusions

6.1 ABA Testing

Acid Base Accounting results indicate that four of six composite flotation tailings samples are non-PAG and two are uncertain acid generating. NAG pH confirmed the acid generating potential of four of the six composite flotation tailings samples as non-PAG. Samples (OM-Master and Bruce Zone composite flotation tailings) that were uncertain acid generating by the ABA analyses reported a NAG pH of 7.8 and 8.4, respectively, which is considered non-acid generating.

Acid Base Accounting results indicate that all six composite detoxed tailings samples are PAG. NAG pH confirmed the acid generating potential of all six detoxed flotation tailings samples as PAG.

Lab results for the six composite flotation samples indicate that all constituents of potential interest are below the Maximum Average Concentration of the MMER criteria by the NAG leachate, SPLP, and supernatant testing. The only COPIs that reports concentrations above the MMER criteria is TSS by the supernatant analysis.

Net acid generation extract results for the composite flotation samples have concentrations greater than the limits of the CCME criteria for free cyanide, silver, aluminum, arsenic, cadmium, chromium, copper, iron, mercury, lead, and selenium. Whereas, SPLP and supernatant results have concentration greater than the limits of the CCME criteria for silver, aluminum, arsenic, cadmium, iron, mercury, and selenium. In addition, the SPLP concentration of the COPIs has concentrations greater than the CCME criteria for copper and zinc and the supernatant concentration of the COPIs has concentrations greater than the CCME for chromium, molybdenum, and lead. Concentrations of all other metals were below the CCME criteria.

Net Acid Generation extract results for the composite detoxed samples have concentrations greater than the limits of the CCME criteria for free cyanide, silver, aluminum, arsenic, cadmium, chromium, copper, iron, mercury, nickel lead, selenium, and zinc. COPIs concentrations that are above both the MMER and CCME criteria are arsenic, copper, nickel, lead, and zinc. SPLP and supernatant results have concentration greater than the limits of the CCME criteria for aluminum, cadmium, copper, mercury, and selenium. In addition, the supernatant concentration of the COPIs has concentrations greater than the CCME criteria for silver, arsenic, chromium, iron, molybdenum, nickel, lead, thallium, and zinc. Concentrations of all other metals were below the MMER and CCME criteria

6.2 Water Balance

Based on the planned operational philosophy, the TCA pond volumes were estimated throughout the life of the project where the initial pond volume is that of Winter Lake, 1.4 million m^3. As the operations continue, the pond volume is continually decreasing as the water in the TCA is used to make up the process water shortfall for operations. For average climatologic conditions, the pond volume ranges from 300,000 to 1.4 million m^3 for the life of the project. After year 4, it is necessary to supply additional makeup water from Giauque Lake for the ore processing operations.

6.3 Impacts on Narrow Lake

Although the new water balance indicates that no discharge from the TCA to the downstream environment is expected during operation, Tyhee plans on discharging TCA supernatant to the downstream environment during the expected term of the initial water license issued by the MVLWB following the Regulatory Phase. A discharge of TCA supernatant at a rate of 140 m^3/hr for 30 days was evaluated to estimate the impact on Narrow Lake. Based on this evaluation, the concentration of copper in the TCA is likely to be the controlling parameter. The copper concentrations within the TCA, will be monitored during operation as part of the water license SNP and the effects of these concentrations on

Narrow Lake, including confirmation of water quality in Narrow Lake meeting CCME guidelines, would be evaluated prior to discharge.

Section 7.0 - References

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Section 8.0 - Acronyms and Abbreviations

°C	degrees Celsius
ABA	Acid base accounting
AGP	Acid Generation Potential
CCME	Canadian Environmental Quality Guidelines
CCME-AL	Canadian Environmental Quality Guidelines for the Protection of Aquatic Life
CIL	Carbon in Leach
CN-	cyanide anion
CNO^-	compounds cyanate
COPI	constituents of potential interest
DAR	Developer's Assessment Report
dtpd	dry tonnes per day
H_2O_2	hydrogen peroxide
HCN	hydrogen cyanide
ICP-MS	Inductively Coupled Plasma-Mass Spectrometry
INCO	International Nickel Company
km	kilometer(s)
Knight Piésold	Knight Piésold and Co.
m	meter(s)
m^3	cubic meter(s)
m^3/h	cubic meters per hour
MA	mineralized amphibolite
mg/L	milligrams per liter
ML	Sandy Silt
mm	millimeter(s)
MMER	Metal Mining Effluent Regulations
MVLWB	Mackenzie Valley Land and Water Board
mol/L	moles per Liter
NAG	net acid generation
NaOH	sodium hydroxide
NNP	Net Neutralization Potential
non-PAG	non-acid generating
NP	Neutralization Potential
NPR	Neutralization Potential Ratio
PAG	potentially acid generating
ppm	parts per million
ROM	Run of Mine
SCN^-	thiocyanate
SIC	Seepage Induced Consolidation
SO_2	sulfur dioxide
SPLP	synthetic precipitation leaching procedure
t/m^3	tonnes per cubic meter
TCA	Tailings Containment Area
TSS	total suspended solids

Tyhee	Tyhee NWT Corp.
UA	unmineralized amphibolite
UN	uncertain acid generating potential
USCS	Unified Soil Classification System
WAD	weak and dissociable
WET	whole effluent toxicity
WRF	waste rock facilities
YGP	Yellowknife Project

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Tables

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Table 4.1
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Tailings Cyanide Destruction Results

Sample ID	Sample Description	CN (Total) mg/L		CN (WAD) mg/L		CN (Free) mg/L	
		Start	End	Start	End	Start	End
DT-1	OM-Master Comp	1225.0	2.88	267.5	1.6	297.3	<2
DT-2	OM-105 Comp	605.0	6.43	137.5	4.9	63.7	<2
DT-3	OM-417 Comp	630.0	0.35	465.0	0.28	668.9	<2
DT-4	OM-559 Comp	915.0	0.15	542.5	0.07	690.2	<2
DT-5	OM-723 Comp	630.0	0.08	355.0	0.06	796.4	<2
DT-6	Bruce Zone Comp	930.0	<0.05	590.0	<0.05	849.5	<2

Table 4.2
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Water Quality Standards

Parameter	Units	Metal Mining Effluent Regulations			CCME (aquatic life)	
		Max Monthly Average	Max Comp Sample	Max any grab sample	Min	Max
pH	S.U.	-	-	-	6.5	9
Aluminum[2]	mg/L	-	-	-	0.005	0.1
Arsenic	mg/L	0.5	0.75	1	0.005	
Boron	mg/L	-	-	-	1.5	
Cadmium	mg/L	-	-	-	0.000017	
Chloride	mg/L	-	-	-	120	
Fluoride	mg/L	-	-	-	0.12	
Chromium (VI)	mg/L	-	-	-	0.001	
Chromium (III)	mg/L	-	-	-	0.0089	
Copper[1]	mg/L	0.3	0.45	0.6	0.002	
Cyanide -Free	mg/L	-	-	-	0.005	
Cyanide -Total	mg/L	1.0	1.5	2.0	-	
Iron	mg/L	-	-	-	0.30	
Lead[1]	mg/L	0.2	0.3	0.4	0.001	
Mercury	mg/L	-	-	-	0.000026	
Molybdenum	mg/L	-	-	-	0.073	
Nickel[1]	mg/L	0.5	0.75	1.0	0.025	
Nitrate-N	mg/L	-	-	-	13	
Nitrite-N	mg/L	-	-	-	0.06	
Selenium	mg/L	-	-	-	0.001	
Silver	mg/L	-	-	-	0.0001	
Radium 226	Bq/L	0.37	0.74	1.11	-	
Thallium	mg/L	-	-	-	0.0008	
Uranium	mg/L	-	-	-	0.015	
Zinc	mg/L	0.5	0.75	1.0	0.03	
TSS	mg/L	15.0	22.5	30.0	-	

Notes:
(1)For copper, lead and nickel the minimum concentration stated by CCME was used regardless of water hardness
(2)CCME values for aluminum range from 0.005 mg/L if pH<6.5 and 0.1 mg/L if pH is ≥6.5

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Table 4.3
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Whole Rock Analysis Results - Flotation Tailings

Parameters	Units	Conc. 5X > avg for a given rock	Sample ID						
			OM-Master Comp flotation tailing	OM-Master Comp flotation tailing, DUP	OM-105 Comp flotation tailing	OM-417 Comp flotation tailing	OM-559 Comp flotation tailing	OM-723 Comp flotation tailing	Bruce Zone Comp flotation tailing
S(t)	%	1500	0.16	0.16	0.12	0.11	0.12	0.11	0.08
S^{-2}	ppm		705	964	592	680	760	838	489
S(SO4)	ppm		354	367	292	294	290	360	259
Ag	ppm	0.25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Al	%	410000	2.01	1.90	1.44	1.72	1.94	2.28	1.78
As	ppm	9.5	31	15	6	13	92	14	22
Ba	ppm	2100	135	129	109	140	242	176	218
Bi	ppm	0.1	<2	<2	<2	<2	<2	<2	<2
Ca	%	150	2.68	2.68	2.48	2.30	2.83	3.32	2.21
Cd	ppm	0.65	1.6	1.6	1.2	1.4	1.6	1.6	1.6
Co	ppm	35	16	15	11	14	13	17	16
Cr	ppm	110	94	91	89	89	109	128	98
Cu	ppm	150	19	18	16	12	13	21	18
Fe	%	147000	5.14	5.14	3.95	4.66	4.63	5.03	4.63
Hg	ppm	0.4	<3	<3	<3	<3	<3	<3	<3
K	%	125000	0.47	0.45	0.47	0.62	0.95	0.54	0.67
La	ppm	240	29	28	32	32	32	19	19
Mg	%	47000	0.74	0.72	0.59	0.66	0.77	0.90	0.70
Mn	ppm	2700	1000	952	771	759	902	806	831
Mo	ppm	5	6	6	5	7	6	9	6
Na	%	142000	0.22	0.22	0.19	0.13	0.15	0.18	0.17
Ni	ppm	75	25	25	20	22	28	34	27
P	ppm	4600	4293	4170	5228	4598	4342	2592	2645
Pb	ppm	75	<2	<2	<2	<2	<2	<2	<2
Sb	ppm	1	<2	<2	<2	<2	<2	<2	<2
Sc	ppm	70	17	17	18	15	18	16	14
Sr	ppm	2200	39	37	36	26	47	61	29
Ti	%	17000	0.14	0.14	0.13	0.14	0.17	0.17	0.21
Tl	ppm	3.6	<10	<10	<10	<10	<10	<10	<10
V	ppm	440	35	33	24	17	23	76	63
W	ppm	6.5	20	20	22	31	16	37	14
Zn	ppm	200	113	110	79	92	132	86	114
Zr	ppm	2200	6	5	5	7	7	9	10

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Table 4.4
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Whole Rock Analysis Results - Detoxed Tailings

Parameters	Units	Conc. 5X > avg for a given rock	Sample ID					
			OM-Master Comp detoxed tailing	OM-105 Comp detoxed tailing	OM-417 Comp detoxed tailing	OM-559 Comp detoxed tailing	OM-723 Comp detoxed tailing	Bruce Zone Comp detoxed tailing
S(t)	%	1500	22.90	24.90	17.20	16.70	20.00	6.48
S-2	%		20.16	22.65	15.46	15.35	17.41	5.03
S(SO4)	ppm		11778	10489	12240	9211	10751	11724
Ag	ppm	0.25	<0.1	<0.1	0.2	<0.1	<0.1	0.2
Al	%	410000	0.87	0.63	1.33	0.90	1.08	1.26
As	ppm	9.5	13685	12724	25228	78197	3190	4943
Ba	ppm	2100	<10	<10	<10	<10	<10	11
Bi	ppm	0.1	<2	<2	<2	<2	27	<2
Ca	%	150	2.76	1.69	3.14	1.68	2.84	2.70
Cd	ppm	0.65	22.6	18.6	11.8	12.2	9.0	4.2
Co	ppm	35	358	424	424	350	392	140
Cr	ppm	110	152	155	135	118	132	113
Cu	ppm	150	3205	2514	1996	1644	3090	2036
Fe	%	147000	24.29	28.21	18.06	19.17	16.37	7.55
Hg	ppm	0.4	<3	<3	<3	<3	<3	<3
K	%	125000	0.08	0.06	0.28	0.20	0.07	0.25
La	ppm	240	28	16	32	23	13	26
Mg	%	47000	0.28	0.19	0.46	0.31	0.45	0.47
Mn	ppm	2700	459	319	626	452	392	669
Mo	ppm	5	20	38	29	20	16	12
Na	%	142000	0.24	0.16	0.19	0.14	0.14	0.25
Ni	ppm	75	198	197	114	193	400	93
P	ppm	4600	4683	2248	4585	2844	1581	3069
Pb	ppm	75	1135	117	129	103	153	39
Sb	ppm	1	96	27	19	39	11	3
Sc	ppm	70	6	4	12	6	8	10
Sr	ppm	2200	53	37	55	31	39	50
Ti	%	17000	0.04	0.02	0.09	0.06	0.11	0.14
Tl	ppm	3.6	<10	<10	<10	<10	<10	<10
V	ppm	440	22	21	20	16	54	42
W	ppm	6.5	101	125	82	77	63	23
Zn	ppm	200	1889	677	1169	355	136	383
Zr	ppm	2200	25	23	38	31	15	11

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Table 4.5
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Tailings Acid Base Accounting Results

Item	Sample ID	Paste pH	Total S %	S^{-2} %	Sulfate S %	Fizz Rating	AGP[1]	NP[1]	NNP[1]	NPR	ARD Classification ABA	ARD Classification NAG
Flotation	OM-Master Comp flotation tailing	7.8	0.16	0.10	0.04	None	3.9	21.1	17.2	5.38	UN	non-PAG
	OM-105 Comp flotation tailing	8.2	0.12	0.06	0.03	None	2.7	22.4	19.7	8.34	non-PAG	non-PAG
	OM-417 Comp flotation tailing	8.2	0.11	0.07	0.03	None	2.6	23.4	20.8	9.06	non-PAG	non-PAG
	OM-559 Comp flotation tailing	8.2	0.12	0.08	0.03	None	2.9	33.0	30.2	11.49	non-PAG	non-PAG
	OM-723 Comp flotation tailing	8.1	0.11	0.08	0.04	None	2.4	39.1	36.6	16.02	non-PAG	non-PAG
	Bruce Zone Comp flotation tailing	8.4	0.08	0.05	0.03	None	1.8	18.2	16.4	10.18	UN	non-PAG
Detoxed	OM-Master Comp detoxed tailing	7.9	22.9	20.2	1.18	None	678.8	19.8	-659.1	0.03	PAG	PAG
	OM-105 Comp detoxed tailing	7.3	24.9	22.7	1.05	None	745.3	15.9	-729.5	0.02	PAG	PAG
	OM-417 Comp detoxed tailing	8.4	17.2	15.5	1.22	None	499.3	24.2	-475.0	0.05	PAG	PAG
	OM-559 Comp detoxed tailing	8.7	16.7	15.4	0.92	None	493.1	20.0	-473.1	0.04	PAG	PAG
	OM-723 Comp detoxed tailing	7.9	20.0	17.4	1.08	None	591.4	38.6	-552.8	0.07	PAG	PAG
	Bruce Zone Comp detoxed tailing	8.6	6.5	5.0	1.17	None	165.9	17.5	-148.4	0.11	PAG	PAG

Notes:
[1]Units are in Kg $CaC0_3$ equivalent per tonne.

Table 4.6
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Net Acid Generation pH Analysis Results

Tailings	Sample ID	NAG pH
Flotation	OM-Master Comp flotation tailing	7.5
	OM-105 Comp flotation tailing	7.7
	OM-417 Comp flotation tailing	7.6
	OM-559 Comp flotation tailing	8.2
	OM-723 Comp flotation tailing	8.3
	Bruce Zone Comp flotation tailing	7.5
Detoxed	OM-Master Comp detoxed tailing	2.4
	OM-105 Comp detoxed tailing	2.2
	OM-417 Comp detoxed tailing	2.1
	OM-559 Comp detoxed tailing	2.0
	OM-723 Comp detoxed tailing	2.1
	Bruce Zone Comp detoxed tailing	2.6

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Table 4.7
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Net Acid Generation Leachate Analysis Results - Flotation Tailings

Parameters	Unit	Water Quality Guidelines		Sample ID					
		CCME Aquatic Life	MMER Max Avg	OM-Master Comp flotation tailing	OM-105 Comp flotation tailing	OM-417 Comp flotation tailing	OM-559 Comp flotation tailing	OM-723 Comp flotation tailing	Bruce Zone Comp flotation tailing
pH		6.5 9	6.0-9.5	7.5	7.7	7.5	8.3	8.3	7.4
TSS	mg/L		15	4.0	1.0	3.0	1.0	1.0	4.0
TDS	mg/L			73.0	127.0	142.0	184.0	181.0	94.0
Alkalinity(bicarbonate)	mg/L			79.4	93.5	105.9	168.3	206.4	77.4
Alkalinity(Total)	mg/L			79.7	94.0	106.2	171.6	210.4	77.6
F	mg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cl	mg/L	120		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NO3	mg/L	13		<0.20	<0.20	<0.20	<0.20	0.35	0.76
SO4	mg/L			34.06	22.04	19.99	21.12	21.05	16.68
Total N	mg/L			<5	<5	<5	<5	6.0	<5
Total CN	mg/L		1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
WAD CN	mg/L			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free CN	mg/L	0.005		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ag	mg/L	0.0001		0.00158	0.00034	0.00048	0.00016	0.00027	0.00029
Al	mg/L	0.005 0.1		0.090	0.330	0.400	0.580	1.010	0.310
As	mg/L	0.005	0.5	0.0249	0.0064	0.0203	0.0780	0.0140	0.0144
B	mg/L	1.5		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ba	mg/L			0.0437	0.0424	0.0560	0.0730	0.0739	0.0597
Be	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bi	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L			33.67	33.24	35.28	58.52	71.76	25.46
Cd	mg/L	0.000017		0.00025	0.00039	0.00005	0.00008	<0.00005	0.00030
Co	mg/L			0.0006	0.0005	0.0007	0.0004	0.0012	0.0019
Cr	mg/L	0.0089		0.055	0.046	0.054	0.070	0.092	0.051
Cu	mg/L	0.002	0.3	0.0066	0.0039	0.0047	0.0053	0.0059	0.0038
Fe	mg/L	0.3		<0.03	0.97	<0.03	<0.03	0.22	<0.03
Ga	mg/L			<0.0001	0.0006	0.0003	0.0009	0.0006	0.0003
Hg	mg/L	0.000026		0.02736	0.01913	0.01689	0.01548	0.01675	0.01336
K	mg/L			11	14	15	21	10	13
Li	mg/L			0.031	0.050	0.043	0.049	0.020	0.023
Mg	mg/L			0.9	0.9	0.8	0.9	1.2	0.7
Mn	mg/L			0.0900	0.0900	0.1300	0.1800	0.1100	0.0700
Mo	mg/L	0.073		0.0234	0.0184	0.0190	0.0177	0.0164	0.0203
Na	mg/L			<2	<2	<2	<2	<2	<2
Ni	mg/L	0.025	0.5	0.006	0.004	0.006	0.004	0.005	0.004
P	mg/L			<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Pb	mg/L	0.001	0.2	0.0024	0.0031	<0.0001	0.0013	0.0027	<0.0001

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Table 4.7
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Net Acid Generation Leachate Analysis Results - Flotation Tailings

Parameters	Unit	Water Quality Guidelines		Sample ID					
		CCME Aquatic Life	MMER Max Avg	OM-Master Comp flotation tailing	OM-105 Comp flotation tailing	OM-417 Comp flotation tailing	OM-559 Comp flotation tailing	OM-723 Comp flotation tailing	Bruce Zone Comp flotation tailing
Sb	mg/L			0.0017	0.0011	0.0010	0.0011	0.0009	0.0008
Se	mg/L	0.001		0.012	<0.002	0.018	0.024	<0.002	0.017
Sc	mg/L			<0.001	0.001	<0.001	0.001	0.002	<0.001
Si	mg/L			1.62	1.93	1.70	1.76	1.95	2.00
Sn	mg/L			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Sr	mg/L			0.0394	0.0371	0.0335	0.0485	0.0330	0.0257
Ti	mg/L			0.02	0.01	<0.01	<0.01	<0.01	0.01
Tl	mg/L	0.0008		0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
V	mg/L			0.015	0.012	0.010	0.007	0.011	0.010
Zn	mg/L	0.03	0.5	0.016	0.009	0.012	0.009	0.012	0.012

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Table 4.8
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Net Acid Generation Leachate Analysis Results - Detoxed Tailings

Items	Unit	Water Quality Guidelines		Sample ID					
		CCME Aquatic Life	MMER Max Avg	OM-Master Comp detoxed tailing	OM-105 Comp detoxed tailing	OM-417 Comp detoxed tailing	OM-559 Comp detoxed tailing	OM-723 Comp detoxed tailing	Bruce Zone Comp detoxed tailing
pH	S.U.	6.5 9	6.0-9.5	2.4	2.2	2.1	2.0	2.1	2.6
TSS	mg/L		15	1.0	2.0	<1	6.0	8.0	1.0
TDS	mg/L			3139.0	3341.0	2818.0	3811.0	2844.0	1378.0
Alkalinity(bicarbonate)	mg/L			<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Alkalinity(Total)	mg/L			<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
F	mg/L			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cl	mg/L	120		<0.50	<0.50	<0.50	<0.50	<0.50	0.98
NO3	mg/L	13		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
SO4	mg/L			1602.08	1923.32	1539.55	2063.75	1775.78	1659.79
Total N	mg/L			15.0	<5	15.0	<5	18.0	18.0
Total CN	mg/L		1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
WAD CN	mg/L			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free CN	mg/L	0.005		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ag	mg/L	0.0001		0.00019	<0.00002	0.00023	<0.00002	<0.00002	<0.00002
Al	mg/L	0.005 0.1		5.740	5.070	11.440	8.990	9.130	6.870
As	mg/L	0.005	0.5	2.6400	1.8168	5.6757	102.3683	2.3403	3.1877
B	mg/L	1.5		<0.02	<0.02	0.03	<0.02	0.03	0.03
Ba	mg/L			0.0296	0.0901	0.1651	0.1223	0.0637	0.1790
Be	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bi	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L			115.55	80.52	135.44	57.03	173.56	100.30
Cd	mg/L	0.000017		0.07653	0.02224	0.03255	0.01191	0.01290	0.01394
Co	mg/L			1.3632	1.6953	1.5061	1.5931	1.5318	0.8105
Cr	mg/L	0.0089		0.041	0.084	0.058	0.035	0.028	0.027
Cu	mg/L	0.002	0.3	21.4757	17.2151	13.4864	10.3595	20.3743	15.0289
Fe	mg/L	0.3		497.08	627	299.87	522.2	310.74	161.22
Ga	mg/L			0.0020	0.0013	0.0028	0.0025	0.0019	0.0007
Hg	mg/L	0.000026		0.02252	0.02438	0.00988	0.00586	0.00946	0.00540
K	mg/L			<2	<2	4	4	<2	3
Li	mg/L			0.016	0.013	0.031	0.032	0.014	0.016
Mg	mg/L			3.9	3.1	5.7	5.0	6.4	3.7
Mn	mg/L			1.0800	0.8400	1.6200	1.1200	1.1100	0.7600
Mo	mg/L	0.073		0.0003	0.0002	0.0008	0.0126	0.0007	<0.0001
Na	mg/L			12	8	6	6	5	12
Ni	mg/L	0.025	0.5	0.549	0.572	0.327	0.688	1.679	0.510
P	mg/L			<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Pb	mg/L	0.001	0.2	3.1966	0.1260	0.5451	0.0759	1.0199	0.2528
Sb	mg/L			0.0023	0.0007	0.0012	0.0049	0.0016	0.0008
Se	mg/L	0.001		0.025	0.030	0.012	0.075	0.062	0.026
Sc	mg/L			0.008	0.007	0.013	0.007	0.013	0.007

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Table 4.8
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Net Acid Generation Leachate Analysis Results - Detoxed Tailings

Items	Unit	Water Quality Guidelines		Sample ID					
		CCME Aquatic Life	MMER Max Avg	OM-Master Comp detoxed tailing	OM-105 Comp detoxed tailing	OM-417 Comp detoxed tailing	OM-559 Comp detoxed tailing	OM-723 Comp detoxed tailing	Bruce Zone Comp detoxed tailing
Si	mg/L			11.65	9.93	16.12	11.76	10.03	9.53
Sn	mg/L			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Sr	mg/L			0.2481	0.2132	0.3074	0.1279	0.1856	0.2358
Ti	mg/L			<0.01	0.02	<0.01	0.03	0.04	0.01
Tl	mg/L	0.0008		<0.0002	<0.0002	0.0004	<0.0002	0.0003	<0.0002
V	mg/L			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zn	mg/L	0.03	0.5	14.348	5.868	9.005	2.718	0.929	4.193

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Table 4.9
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

SPLP Tailings Results

Items	Unit	Water Quality Guidelines		Sample ID		
		CCME Aquatic Life Min Max	MMER Max Avg	OM-Master Comp flotation tailing	Bruce Zone Comp flotation tailing	OM-Master Comp detoxed tailing
pH	S.U.	6.5 9	6.0-9.5	8.8	9.1	8.3
Ag	mg/L	0.0001		<0.00002	0.01446	<0.00002
Al	mg/L	0.005 0.1		5.858	<0.002	0.279
As	mg/L	0.005	0.5	<0.0005	0.0687	<0.0005
B	mg/L	1.5		<0.02	<0.02	<0.02
Ba	mg/L			0.0067	0.0441	0.0008
Be	mg/L			<0.001	0.002	<0.001
Bi	mg/L			<0.001	<0.001	<0.001
Ca	mg/L			6.09	185.44	<0.05
Cd	mg/L	0.000017		0.00048	<0.00005	<0.00005
Co	mg/L			<0.0002	0.0432	0.0004
Cr	mg/L	0.0089		<0.001	<0.001	<0.001
Cu	mg/L	0.002	0.3	0.0157	0.0677	0.0079
Fe	mg/L	0.3		<0.03	8.40	<0.03
Ga	mg/L			0.0007	<0.0001	<0.0001
Hg	mg/L	0.000026		0.00945	0.02150	0.01043
K	mg/L			4	<2	<2
Li	mg/L			0.007	0.006	<0.005
Mg	mg/L			0.5	0.5	<0.1
Mn	mg/L			0.0295	0.0765	0.0705
Mo	mg/L	0.073		0.0166	0.0070	0.0008
Na	mg/L			<2	50	<2
Ni	mg/L	0.025	0.5	0.003	0.008	0.003
P	mg/L			<0.3	<0.3	<0.3
Pb	mg/L	0.001	0.2	0.0007	<0.0001	<0.0001
Sb	mg/L			0.0004	0.0315	0.0008
Se	mg/L	0.001		<0.002	<0.002	<0.002
Sc	mg/L			0.002	<0.001	<0.001
Si	mg/L			6.80	8.10	3.00
Sn	mg/L			<0.002	<0.002	<0.002
Sr	mg/L			0.0146	0.4413	<0.0002
Ti	mg/L			<0.01	<0.01	<0.01
Tl	mg/L	0.0008		<0.0002	<0.0002	<0.0002
V	mg/L			0.014	<0.002	0.004
Zn	mg/L	0.03	0.5	0.044	0.021	0.013

Table 4.10
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Supernatant Analysis Results - Flotation Tailings

Items	Unit	Water Quality Guidelines		Sample ID					
		CCME Aquatic Life Min Max	MMER Max Avg	OM-Master Comp flotation tailing	OM-105 Comp flotation tailing	OM-417 Comp flotation tailing	OM-559 Comp flotation tailing	OM-723 Comp flotation tailing	Bruce Zone Comp flotation tailing
pH		6.5 9	6.0-9.5	8.0	8.1	8.0	7.9	7.9	8.0
TSS	mg/L		15	3.0	16.0	4.0	4.0	2.0	8.0
TDS	mg/L			13.0	141.0	146.0	135.0	147.0	151.0
Alkalinity(bicarbonate)	mg/L			59.7	73.7	84.0	76.0	77.0	74.9
Alkalinity(Total)	mg/L			60.3	74.6	84.8	76.6	77.6	75.6
F	mg/L			0.55	0.59	0.69	0.74	0.70	0.58
Cl	mg/L	120		3.70	6.04	8.30	8.22	8.12	5.99
NO3	mg/L	13		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
SO4	mg/L			30.49	48.91	40.12	40.37	46.88	39.43
Total N	mg/L			51.0	6.0	27.0	<5	<5	<5
Total CN	mg/L		1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
WAD CN	mg/L			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free CN	mg/L	0.005		<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Ag	mg/L	0.0001		0.00191	0.00046	0.00047	0.00029	0.00027	0.00052
Al	mg/L	0.005 0.1		0.190	0.290	0.250	0.140	0.110	0.160
As	mg/L	0.005	0.5	0.0079	0.0105	0.0201	0.1284	0.0033	0.0041
B	mg/L	1.5		0.03	0.03	0.04	0.03	0.22	0.03
Ba	mg/L			0.0155	0.0135	0.0164	0.0216	0.0149	0.0193
Be	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bi	mg/L			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L			22.79	21.63	22.01	20.49	28.19	22.01
Cd	mg/L	0.000017	0.005	0.00025	0.00065	0.00080	0.00080	0.00085	0.00096
Co	mg/L			<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002
Cr	mg/L	0.001 0.0089		0.019	0.024	0.031	0.026	0.027	0.026
Cu	mg/L	0.002	0.3	<0.0002	0.0004	0.0004	0.0003	0.0003	0.0002
Fe	mg/L	0.3		0.34	0.51	0.25	0.15	0.04	0.16
Ga	mg/L			0.0001	0.0002	0.0003	0.0002	0.0001	0.0001
Hg	mg/L	0.000026		0.00260	0.00212	0.00150	0.00125	0.00123	0.00102
K	mg/L			8	13	13	18	11	13
Li	mg/L			0.012	0.015	0.010	0.014	0.006	0.009
Mg	mg/L			2.7	3.6	3.5	2.6	6.0	4.1
Mn	mg/L			0.0700	0.0600	0.0400	0.0500	0.0400	0.0400
Mo	mg/L	0.073		0.0922	0.2602	0.3256	0.3052	0.3636	0.4101
Na	mg/L			10	22	24	16	12	15
Ni	mg/L	0.025	0.5	0.000	0.001	0.001	<0.001	0.001	<0.001
P	mg/L			90.5	38.8	31.6	27.2	24.5	21.6
Pb	mg/L	0.001	0.2	0.0058	0.0051	0.0049	0.0037	0.0027	0.0034
Sb	mg/L			0.0015	0.0013	0.0013	0.0011	0.0011	0.0010
Se	mg/L	0.001		0.002	<0.002	<0.002	<0.002	<0.002	<0.002

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Table 4.10
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Supernatant Analysis Results - Flotation Tailings

Items	Unit	Water Quality Guidelines		Sample ID					
		CCME Aquatic Life Min Max	MMER Max Avg	OM-Master Comp flotation tailing	OM-105 Comp flotation tailing	OM-417 Comp flotation tailing	OM-559 Comp flotation tailing	OM-723 Comp flotation tailing	Bruce Zone Comp flotation tailing
Sc	mg/L			0.001	0.001	0.001	0.001	0.001	0.001
Si	mg/L			1.62	1.93	1.70	1.76	1.95	2.00
Sn	mg/L			<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Sr	mg/L			0.0533	0.0759	0.0710	0.0726	0.0805	0.0671
Ti	mg/L			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tl	mg/L	0.0008		0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
V	mg/L			0.014	0.011	0.011	0.010	0.009	0.008
Zn	mg/L	0.03	0.5	0.001	<0.001	<0.001	<0.001	<0.001	<0.001

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Table 4.11
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Supernatant Analysis Results - Detoxed Tailings

Items	Unit	Water Quality Guidelines			Sample ID					
		CCME Aquatic Life Min	CCME Aquatic Life Max	MMER Max Avg	OM-Master Comp detoxed tailing	OM-105 Comp detoxed tailing	OM-417 Comp detoxed tailing	OM-559 Comp detoxed tailing	OM-723 Comp detoxed tailing	Bruce Zone Comp detoxed tailing
pH		6.5	9	6.0-9.5	8.0	8.3	8.4	8.7	8.2	8.4
TSS	mg/L			15	730.0	1.0	28.0	13.0	16.0	7.0
TDS	mg/L				21219.0	33345.0	27265.0	12373.0	17246.0	25964.0
Alkalinity(bicarbonate)	mg/L				235.8	190.4	474.0	717.9	477.8	487.1
Alkalinity(Total)	mg/L				238.0	193.9	484.8	752.7	484.8	500.1
F	mg/L				0.27	0.07	0.27	0.08	0.23	0.24
Cl	mg/L	120			44.40	43.72	34.52	8.33	6.75	2.57
NO3	mg/L	13			0.50	0.78	0.56	0.25	0.18	0.36
SO4	mg/L				9874.61	8118.80	13229.39	7592.69	9835.63	12561.80
Total N	mg/L				660.0	960.0	270.0	255.0	330.0	210.0
Total CN	mg/L			1.0	2.88	6.43	0.35	0.15	0.08	<0.05
WAD CN	mg/L				1.61	4.90	0.28	0.07	0.06	<0.05
Free CN	mg/L	0.005			<2.00	<2.00	<2.00	<2.00	<2.00	<2.00
Ag	mg/L	0.0001			0.00465	0.00548	0.00125	0.00039	0.00068	0.00068
Al	mg/L	0.005	0.1		0.620	1.920	<0.002	0.020	<0.002	0.010
As	mg/L	0.005		0.5	0.1569	0.1352	80.8174	224.4193	0.1973	15.9581
B	mg/L	1.5			0.02	0.02	0.04	0.05	0.07	0.03
Ba	mg/L				0.0769	0.0495	0.2254	0.1056	0.0463	0.0893
Be	mg/L				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bi	mg/L				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L				555.08	820.77	464.12	612.12	410.90	430.32
Cd	mg/L	0.000017			0.00072	0.00041	0.00131	0.00113	0.00097	0.00174
Co	mg/L				1.8575	3.1490	1.7587	0.2308	0.1163	0.0275
Cr	mg/L	0.001	0.0089		0.106	0.014	0.287	0.263	0.180	0.234
Cu	mg/L	0.002		0.3	2.9497	1.0107	0.8138	0.1057	0.9504	5.2709
Fe	mg/L	0.3			104.16	293.84	0.44	0.12	0.03	0.08
Ga	mg/L				0.0001	0.0002	0.0005	0.0003	0.0001	0.0003
Hg	mg/L	0.000026			0.00251	0.00604	0.00435	0.00141	0.00082	0.00169
K	mg/L				21	35	33	22	21	16
Li	mg/L				0.033	0.078	0.046	0.054	0.047	0.057
Mg	mg/L				15.3	21.1	17.3	7.9	15.4	15.2
Mn	mg/L				0.0600	0.0800	0.1200	0.1100	0.2700	0.3000
Mo	mg/L	0.073			0.3700	0.2488	0.3608	0.2759	0.1244	0.1919
Na	mg/L				5665	7385	6378	3182	4690	5629
Ni	mg/L	0.025		0.5	0.017	0.009	0.029	0.011	0.043	0.054
P	mg/L				21.1	18.6	18.8	15.5	14.1	12.8
Pb	mg/L	0.001		0.2	0.0004	0.0061	0.0069	0.0019	0.0022	0.0023
Sb	mg/L				0.2378	0.0062	0.1861	0.1777	0.1088	0.2094
Se	mg/L	0.001			0.858	0.592	0.756	0.287	0.291	0.372

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Table 4.11
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Supernatant Analysis Results - Detoxed Tailings

Items	Unit	Water Quality Guidelines			Sample ID					
		CCME Aquatic Life Min	Max	MMER Max Avg	OM-Master Comp detoxed tailing	OM-105 Comp detoxed tailing	OM-417 Comp detoxed tailing	OM-559 Comp detoxed tailing	OM-723 Comp detoxed tailing	Bruce Zone Comp detoxed tailing
Sc	mg/L				0.003	0.002	0.008	0.009	0.007	0.009
Si	mg/L				11.65	9.93	16.12	11.76	10.03	9.53
Sn	mg/L				<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Sr	mg/L				2.6106	2.9127	2.3315	1.6570	2.6336	2.4808
Ti	mg/L				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tl	mg/L	0.0008			<0.0002	<0.0002	<0.0002	<0.0002	0.0011	0.0002
V	mg/L				0.010	0.016	0.018	0.014	0.012	0.013
Zn	mg/L	0.03		0.5	0.021	0.068	0.046	0.018	0.040	0.107

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Table 5.1
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Estimated TCA Concentrations

			Year			
Parameter	**MMER (µg/L)**	**CCME (µg/L)**	**1 (µg/L)**	**4 (µg/L)**	**8 (µg/L)**	**12 (µg/L)**
As	500	5.0	10	59	15	8
Cu	300	2 - 4	50	208	75	35
CN	1000	5.0	100	144	100	50
Ni	500	25 - 150	0.8	3.3	1.2	0.5
Pb	200	1 - 7	3	14	4	2
Zn	500	30	0.7	2.9	1	0.8

Table 5.2
Tyhee NWT Corp.
Yellowknife Gold Project
Site Wide Water Balance and Geochemistry

Equilibrium Concentration in Narrow Lake

			Year			
Parameter	**MMER (µg/L)**	**CCME (µg/L)**	**1 (µg/L)**	**4 (µg/L)**	**8 (µg/L)**	**12 (µg/L)**
As	500	5.0	0.8	4.8	1.2	0.6
Cu	300	2 - 4	4	17	6	2.8
CN	1000	5.0	8	11.5	8	4
Ni	500	25 - 150	*	*	*	*
Pb	200	1 - 7	0.2	1.1	0.3	0.2
Zn	500	30	*	*	*	*

Note:
*Concentration in the TCA is below CEQG guidelines so additional evaluation was not necessary.

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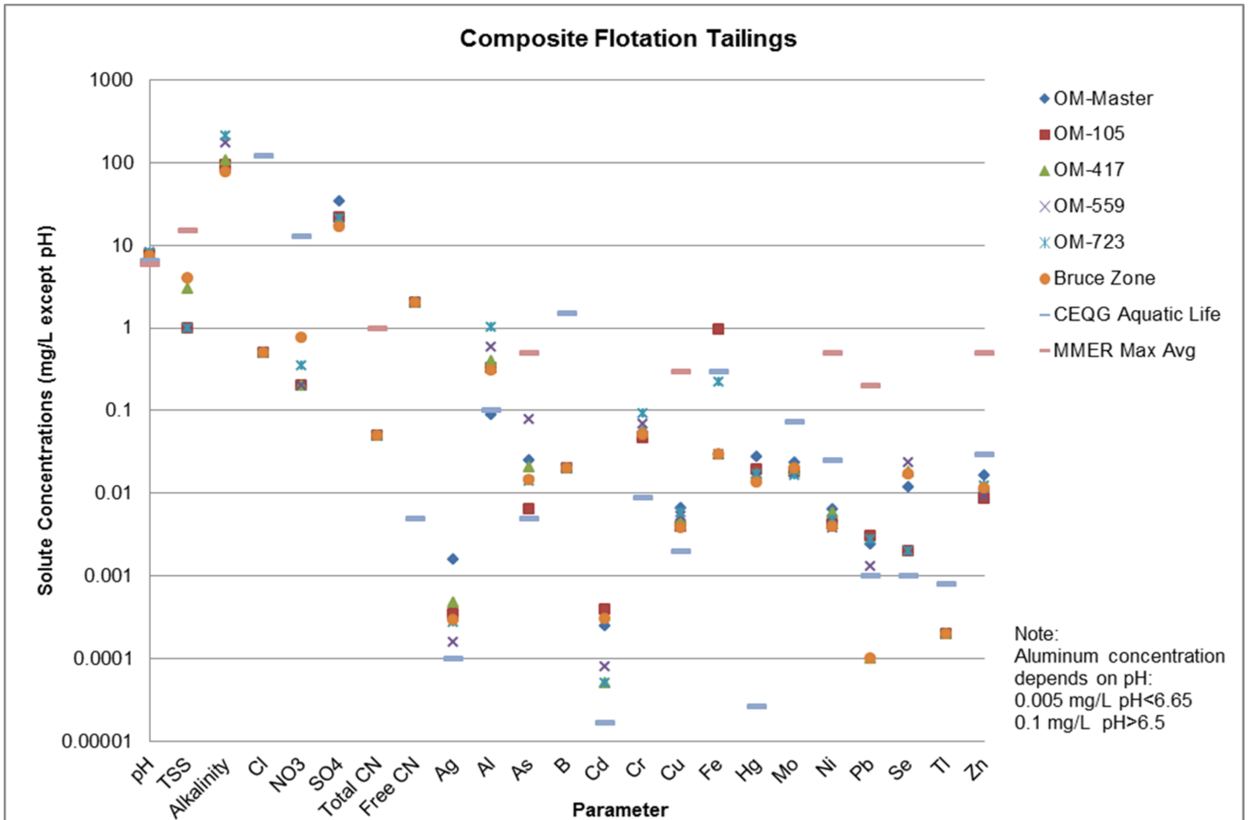
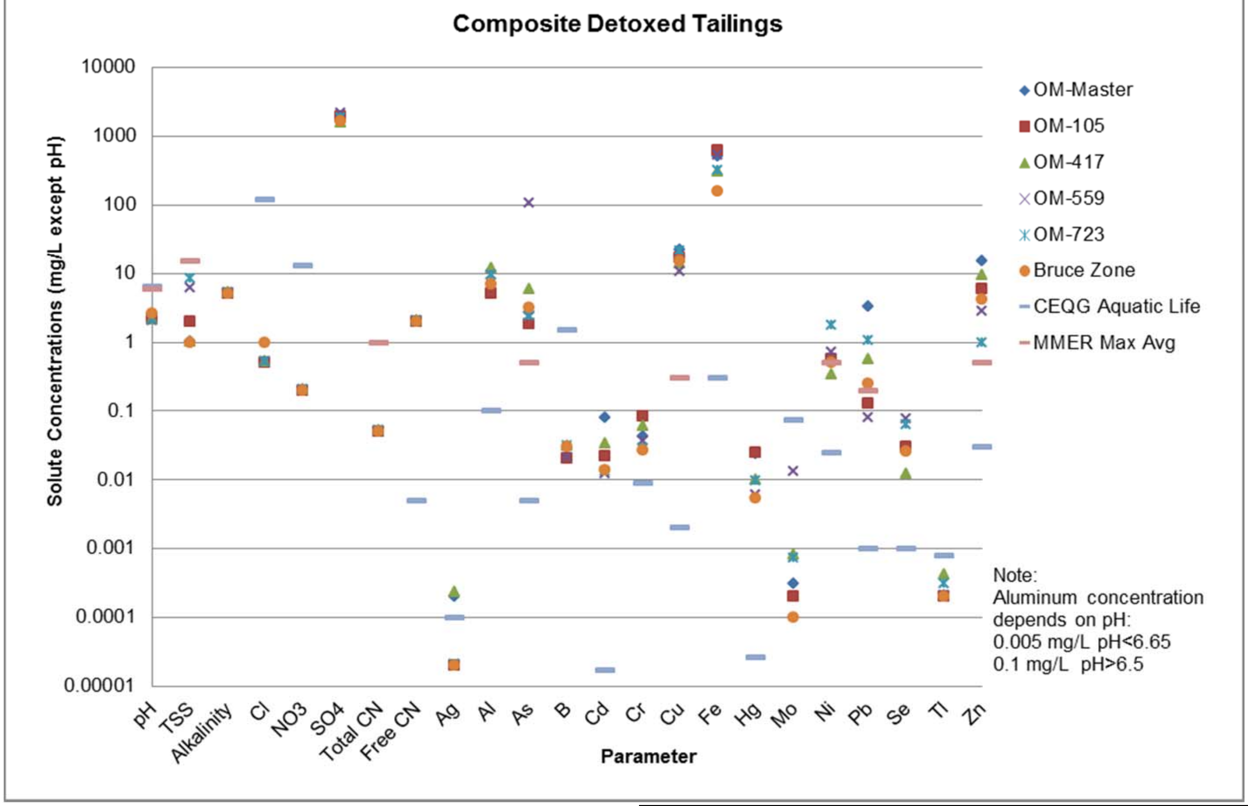
Figures





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PROJECT	Yellowknife Gold Project				
TITLE	Site Wide Water Balance and Geochemistry Tailings NAG Leachate Results				
	Knight Piésold CONSULTING				
DESIGNED BY	GF	LOCATION	PROJECT NUMBER	FIGURE NUMBER	REVISION
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ACTIVITY CODE	N/A	XREF NUMBER	N/A		

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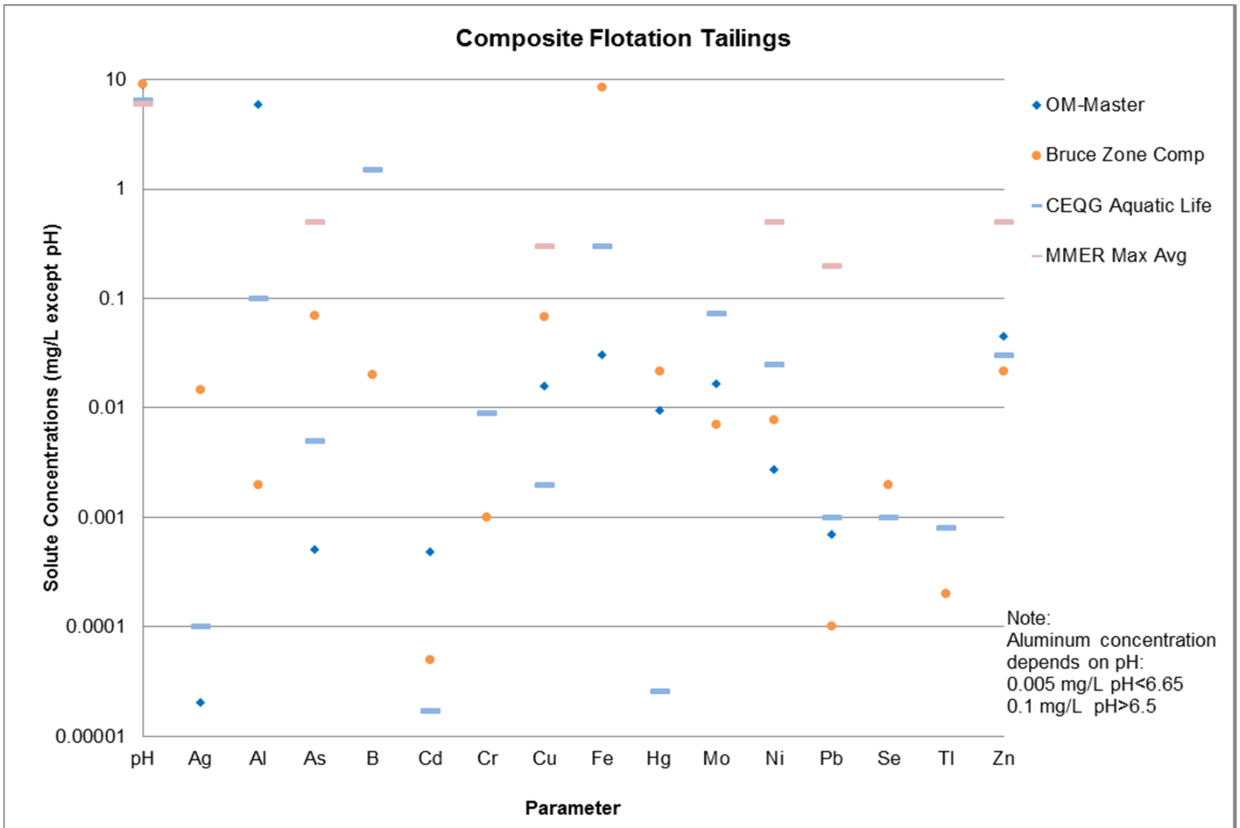

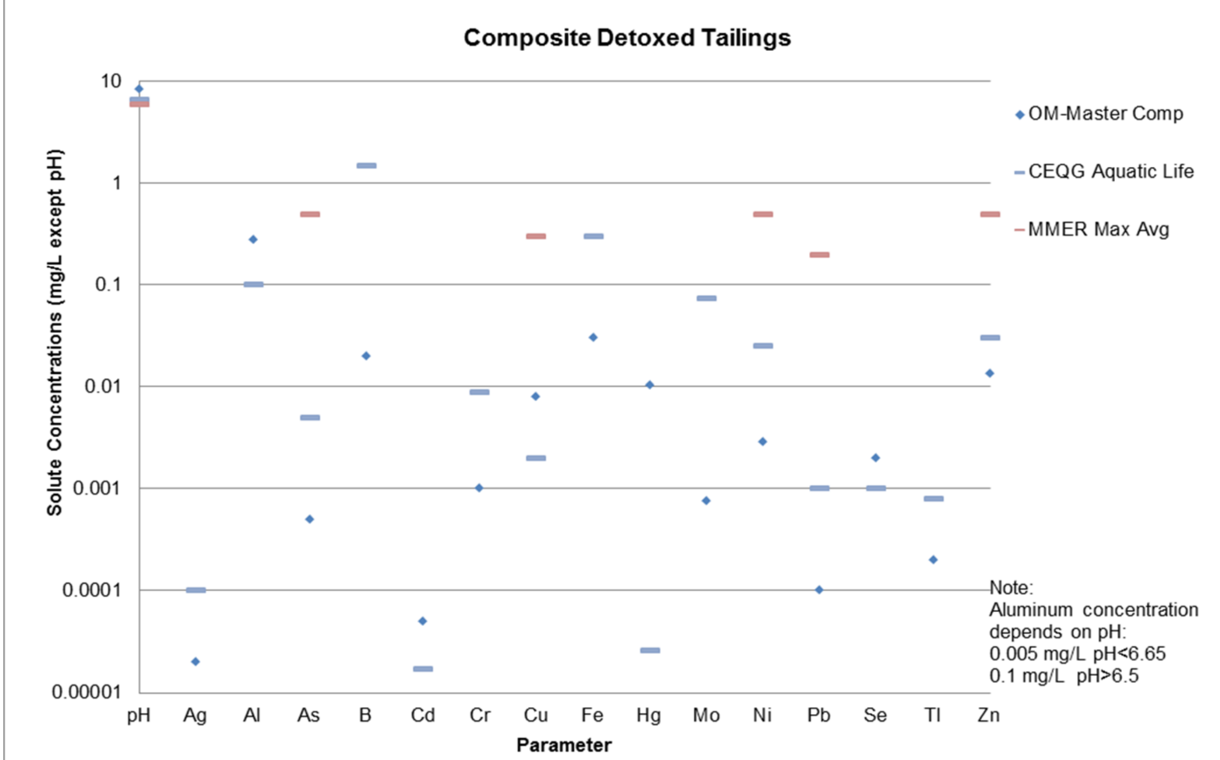

CLIENT
Tyhee NWT Corp.

PROJECT
Yellowknife Gold Project

TITLE
Site Wide Water Balance and Geochemistry
Tailings SPLP Results

Knight Piésold CONSULTING

DESIGNED BY	GF	LOCATION	PROJECT NUMBER	FIGURE NUMBER	REVISION
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ACTIVITY CODE	N/A	XREF NUMBER	N/A		

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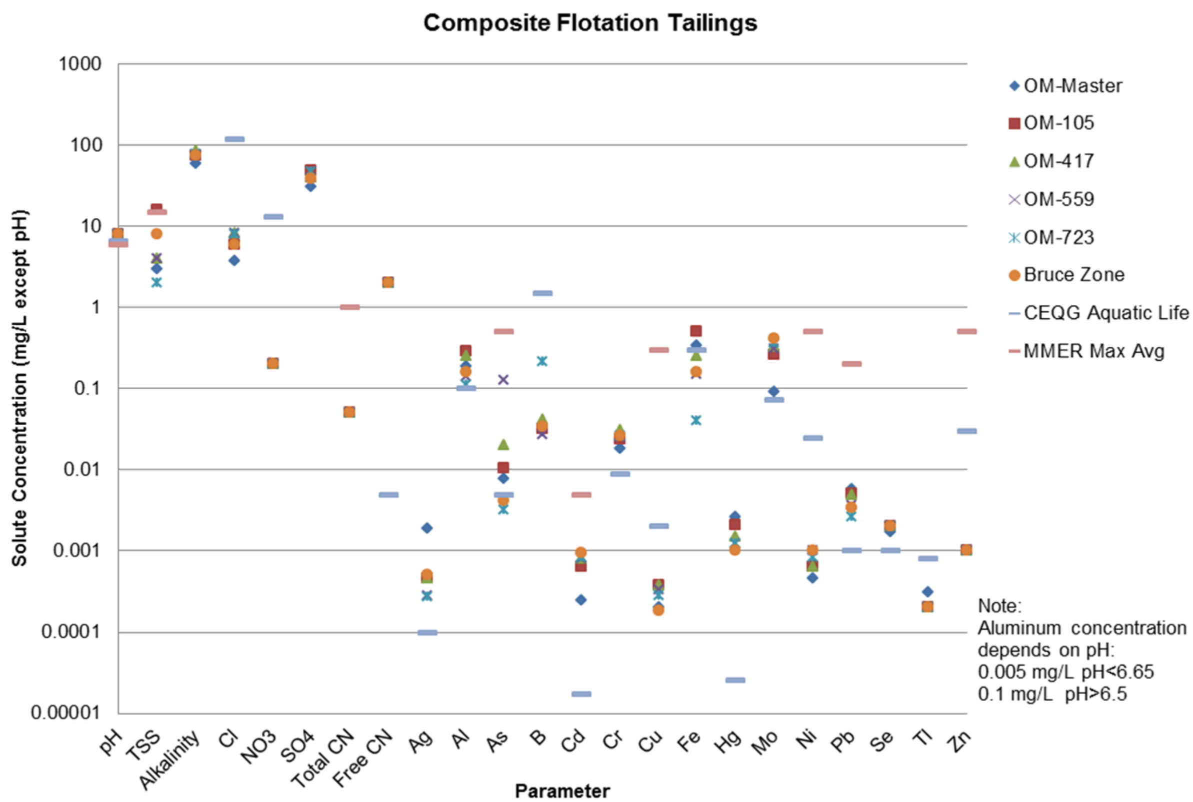

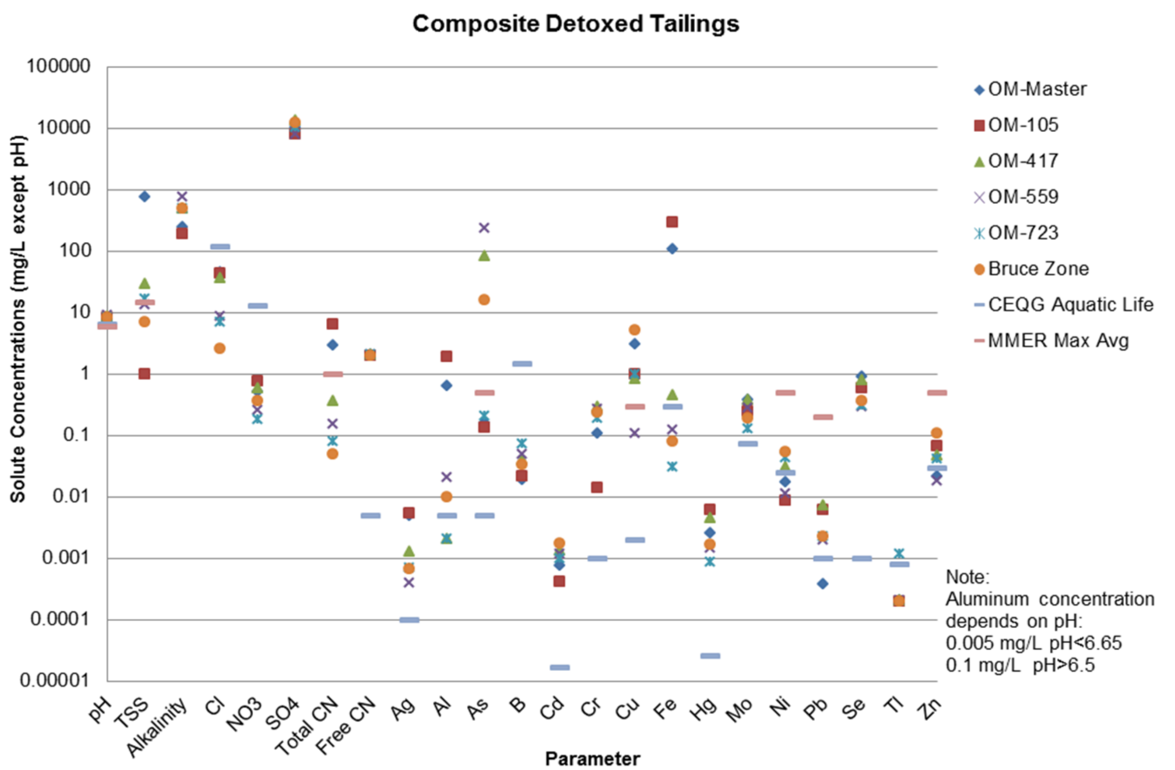

CLIENT	**Tyhee NWT Corp.**
PROJECT	**Yellowknife Gold Project**
TITLE	**Site Wide Water Balance and Geochemistry Tailings Supernatant Results**

Knight Piésold CONSULTING

DESIGNED BY	GF	LOCATION	PROJECT NUMBER	FIGURE NUMBER	REVISION
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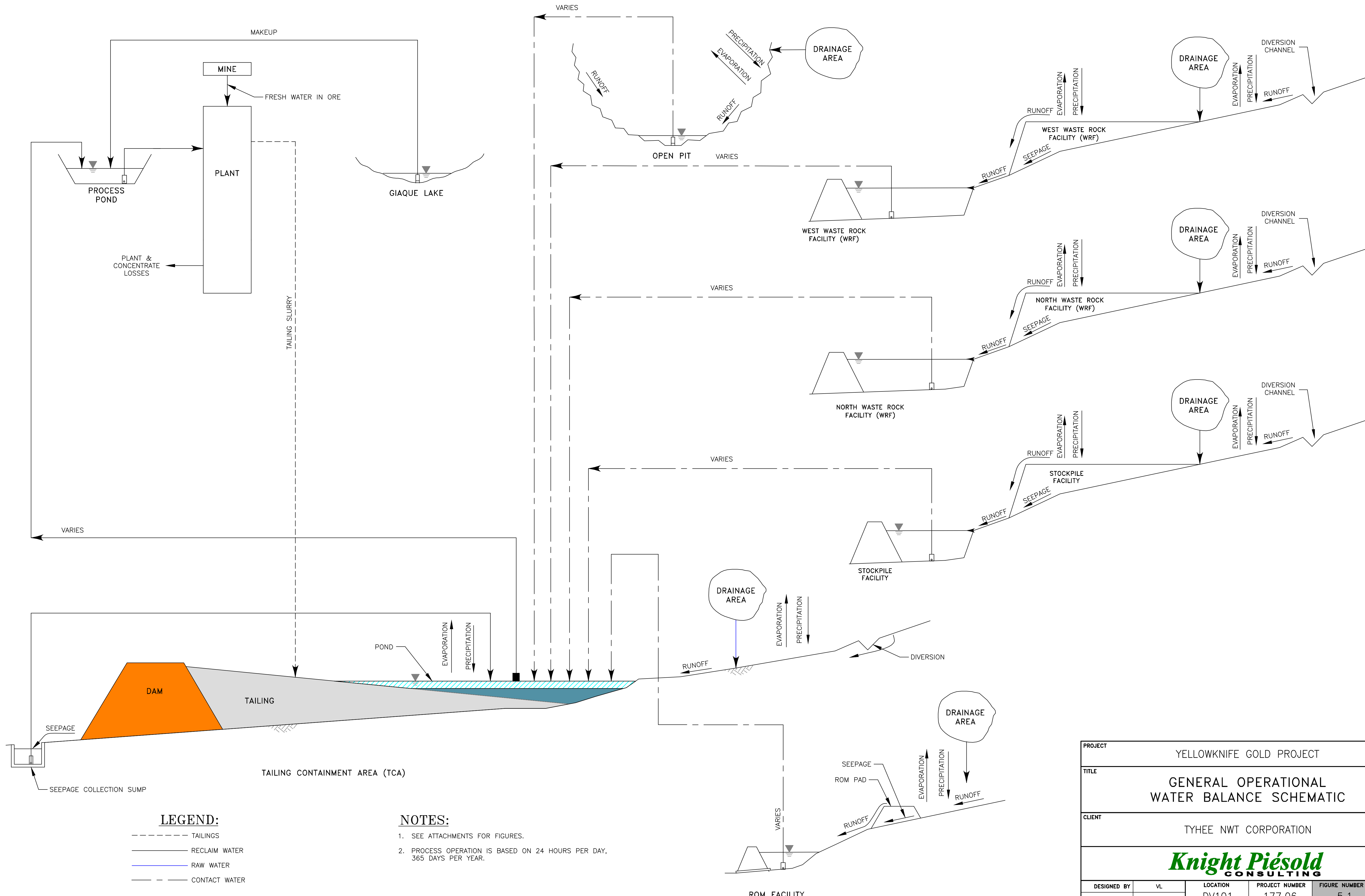

LEGEND:

- TAILINGS
- RECLAIM WATER
- RAW WATER
- CONTACT WATER

NOTES:

1. SEE ATTACHMENTS FOR FIGURES.
2. PROCESS OPERATION IS BASED ON 24 HOURS PER DAY, 365 DAYS PER YEAR.

PROJECT	YELLOWKNIFE GOLD PROJECT
TITLE	GENERAL OPERATIONAL WATER BALANCE SCHEMATIC
CLIENT	TYHEE NWT CORPORATION

Knight Piésold CONSULTING

DESIGNED BY	VL	LOCATION	PROJECT NUMBER	FIGURE NUMBER	REVISION
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ACTIVITY CODE	N/A	XREF NUMBER	N/A		

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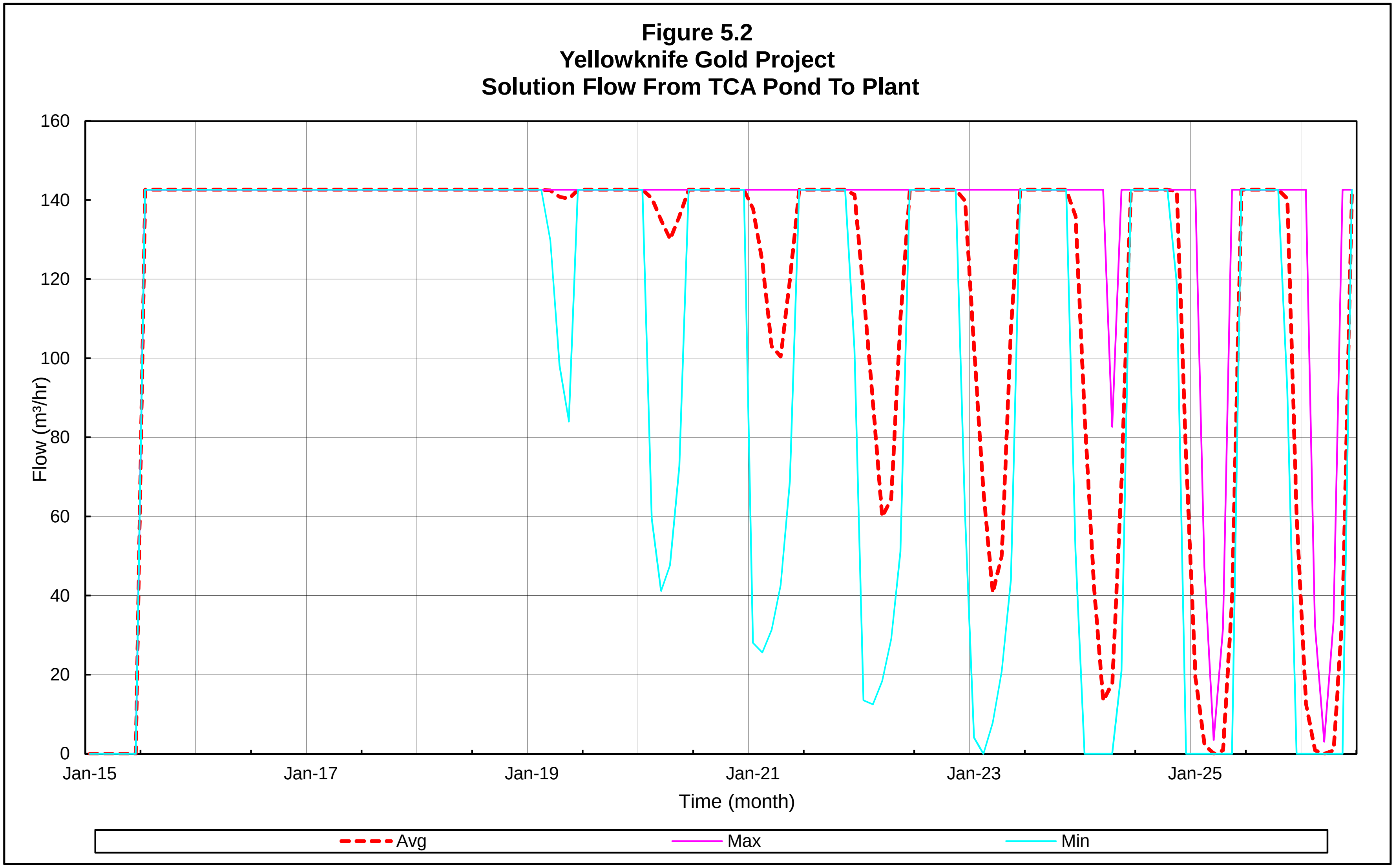


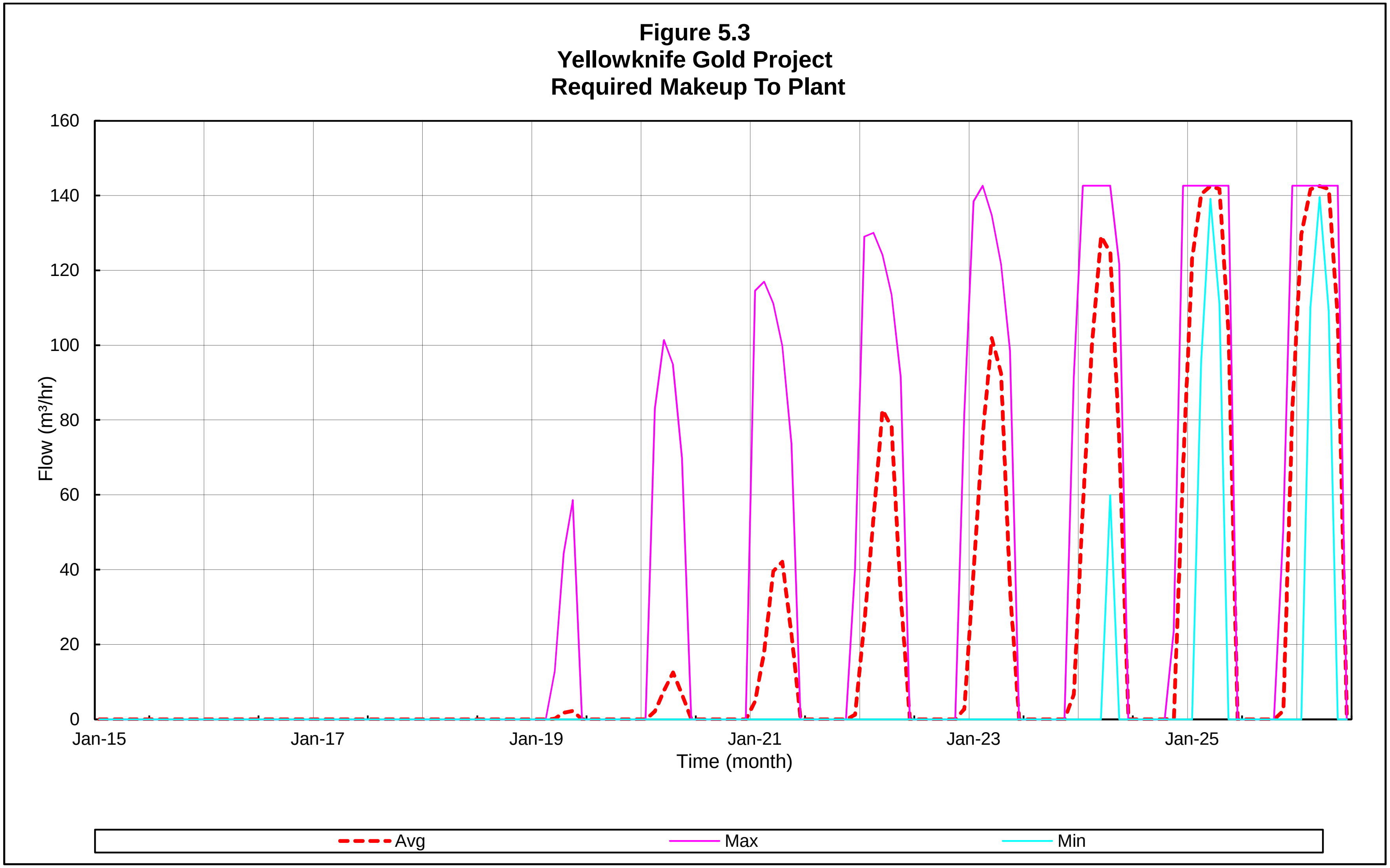
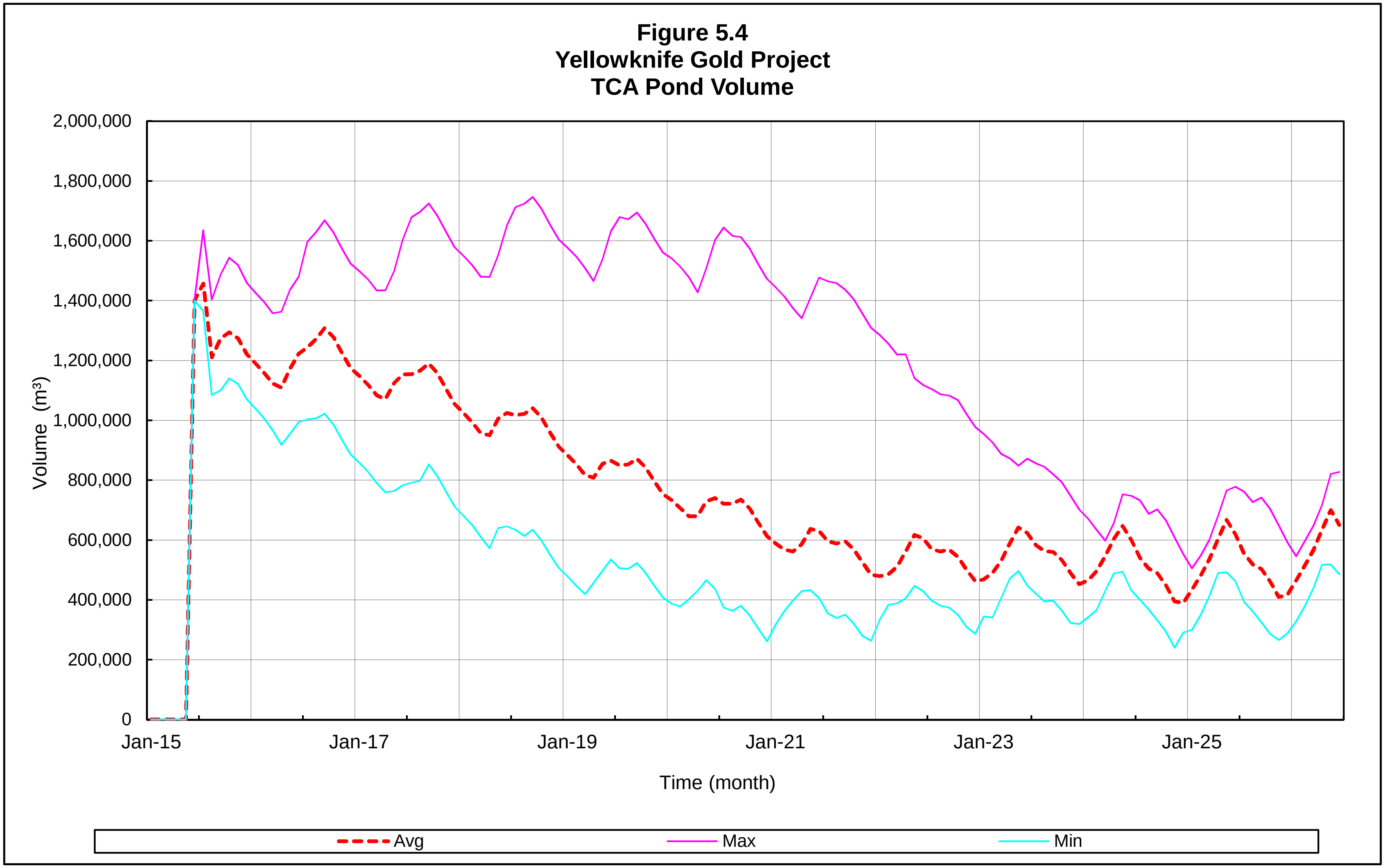


Figure 5.3
Yellowknife Gold Project
Required Makeup To Plant
160
140
120
100
80
60
40
20
0
Flow (m³/hr)
Jan-15
Jan-17
Jan-19
Jan-21
Jan-23
Jan-25
Time (month)
Avg
Max
Min



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Appendix A

Cyanide Destruct Test Results

CYANIDE DESTRUCTION TEST REPORT

Client: Tyhee Gold Corp. - Yellowknife Gold Project
Test: DT-1
Sample: CIL1 Cyanide leach residue slurry (OM-Master Comp)

Date: 7-May-12
Project: 1105509

Objective: Continuous cyanide destruction test by Inco process

TEST CONDITIONS

Solids:	3,600 g
Slurry volume	10.0 L
Initial Free CN:	268.0 mg/L
Initial ORP:	-84.0 mV
Initial pH:	10.3
MBS Consumption:	6.69 g/gTCN
SO_2 Consumption:	4.50 gSO_2/TCN
$CuSO_4$ Consumption:	0.91 g/gTCN

TEST DESCRIPTION

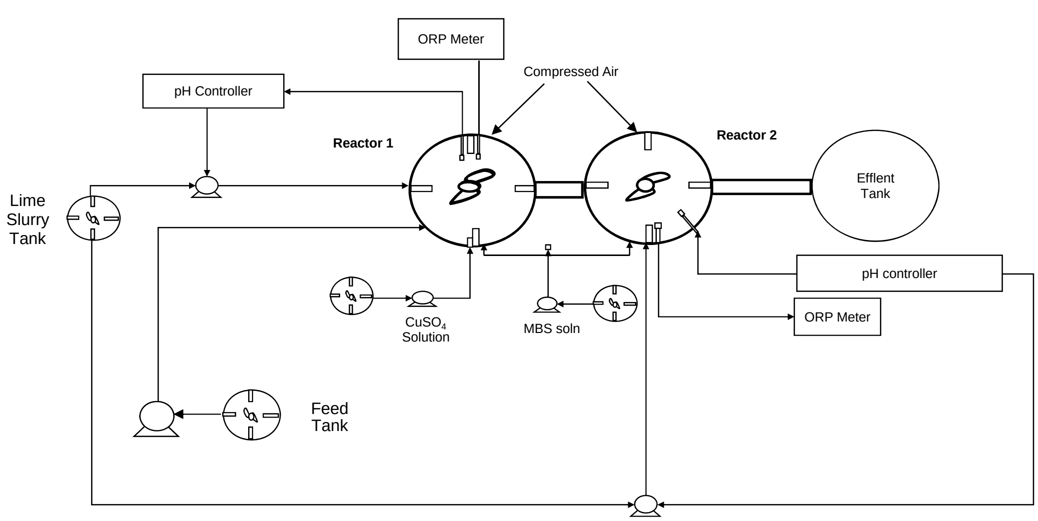
- Test conducted in two 1.5 L reactors with overhead agitation
- air sparged via 2 pumps
- maintained pH in range 8.2 -8.8 during the test by lime addition
- maintained ORP above +70 mv during the test by adding $Na_2S_2O_5$ (MBS) as 100g/L solution
- Cu added as 5% solution of $CuSO_4$
- monitored free cyanide by titration method after 30 min
- after two hrs started continuous running
- solution assay for CN species and other environmental parameters

BATCH TEST DATA

Time hours	MBS g	Lime g	CuSO4 g	pH	ORP mV	Free CN mg/L
0.0				10.3	-84	297.3
0.5	6.0	3.0		8.7	64	116.8
1.0	3.3	1.0		8.8	73	31.9
1.5	3.3	1.0		8.4	79	10.6
2.0	3.3	1.0		8.3	87	<10
Total	15.9	3.0	0.6			

CONTINUOUS TEST DATA

Time	MBS	Lime	CuSO4	pH	ORP	Free CN	Feed and Final Solution Assay			
							(Total)CN-	(WAD)CN-	SCN-	CNO-
hours	g	g	g		mV	mg/L	mg/L	mg/L	mg/L	mg/L
Feed				10.3	-84	297.3	1,225.0	267.5	3211.90	112.03
1.5	11.9			8.6	133					
3.0	11.9			8.5	142					
4.0	8.6			8.8	152					
5.0	8.4			8.8	110					
6.0	8.4			8.7	124					
7.0	8.4			8.7	133					
8.0	8.4			8.8	133	<2	2.88	1.6	2047.57	169.21
Total	66.0	30.0	10.5							



CYANIDE DESTRUCTION TEST REPORT

Client: Tyhee Gold Corp. - Yellowknife Gold Project
Test: DT-2
Sample: CIL2 Cyanide leach residue slurry (OM-105 Comp)

Date: 7-May-12
Project: 1105509

Objective: Batch cyanide destruction test by Inco process

TEST CONDITIONS

Solids:	434 g
Slurry volume	1.3 L
Initial Free CN:	63.7 mg/L
Initial ORP:	-51.0 mV
Initial pH:	9.8
Test Duration:	5.0 hours
MBS Consumption:	13.99 g/gTCN
SO2 Consumption:	9.42 gSO2/TCN
CuSO4 Consumption:	2.03 g/gTCN

TEST DESCRIPTION

- test conducted in a 2 L reactor with overhead agitation
- air sparged via an air pump
- maintained pH in range 8.2 -8.8 during the test by lime addition
- maintained ORP above +70 mv during the test by adding Na2S2O5 (MBS) as 100g/L solution
- Cu added as 5% solution of CuSO4
- monitored free cyanide by titration withtitration method after 30 min
- solution assay for CN species and other environmental parameters

TEST DATA

Time	MBS	Lime	CuSO4	pH	ORP	Free CN	Feed and Final Solution Assay			
							(Total)CN-	(WAD)CN-	SCN-	CNO-
hours	g	g	g		mV	mg/L	mg/L	mg/L	mg/L	mg/L
0.0				9.8	-51	63.7	605.0	137.5	3814.10	123.81
0.5	2.4			8.5	67	53.1				
1.0	1.7			8.8	70	42.5				
1.5	1.6			8.7	71	37.2				
2.0	1.1			8.6	75	31.8				
2.5	1.0			8.6	74	21.2				
3.0	1.0			8.6	76	10.6				
3.5	1.0			8.6	76					
4.0	0.6			8.6	76					
5.0	0.6			8.5	76	<2	6.43	4.9	3231.946	121.37
Total	11.0	2.7	1.6							

CYANIDE DESTRUCTION TEST REPORT

Client: Tyhee Gold Corp. - Yellowknife Gold Project
Test: DT-3
Sample: CIL3 Cyanide leach residue slurry (OM-417 Comp)

Date: 7-May-12
Project: 1105509

Objective: Batch cyanide destruction test by Inco process

TEST CONDITIONS

Solids:	428 g
Slurry volume	1.2 L
Initial Free CN:	668.9 mg/L
Initial ORP:	-45.0 mV
Initial pH:	11.1
Test Duration:	3.5 hours
MBS Consumption:	13.23 g/gTCN
SO2 Consumption:	8.91 gSO2/TCN
CuSO4 Consumption:	1.46 g/gTCN

TEST DESCRIPTION

- Test conducted in a 2 L reactor with overhead agitation
- air sparged via an air pump
- maintained pH in range 8.2 -8.8 during the test by lime addition
- maintained ORP above +70 mv during the test by adding Na2S2O5 (MBS) as 100g/L solution
- Cu added as 5% solution of CuSO4
- monitored free cyanide by titration withtitration method after 30 min
- solution assay for CN species and other environmental parameters

TEST DATA

Time	MBS	Lime	CuSO4	pH	ORP	Free CN	Feed and Final Solution Assay			
							(Total)CN-	(WAD)CN-	SCN-	CNO-
hours	g	g	g		mV	mg/L	mg/L	mg/L	mg/L	mg/L
0.0				11.1	-45	668.9	630.0	465.0	732.7	211.4
0.5	4.0			8.5	69	169.9				
1.0	1.5			8.7	75	138.0				
1.5	1.5			8.6	76	84.9				
2.0	1.0			8.5	114	26.5				
2.5	1.0			8.6	111	10.6				
3.0	0.6			8.6	117					
3.5	0.4			8.4	118	<2	0.35	0.28	398.5	466.4
Total	10.0	4.0	1.1							

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CYANIDE DESTRUCTION TEST REPORT

Client: Tyhee Gold Corp. - Yellowknife Gold Project
Test: DT-4
Sample: CIL4 Cyanide leach residue slurry (OM-559 Comp)

Date: 7-May-12
Project: 1105509

Objective: Batch cyanide destruction test by Inco process

TEST CONDITIONS

Solids:	617	g
Slurry volume	1.7	L
Initial Free CN:	690.2	mg/L
Initial ORP:	-100	mV
Initial pH:	10.7	
Test Duration:	3.5	hours
MBS Consumption:	5.98	g/gTCN
SO2 Consumption:	4.03	gSO2/TCN
CuSO4 Consumption:	0.93	g/gTCN

TEST DESCRIPTION

- Test conducted in a 2 L reactor with overhead agitation
- air sparged via an air pump
- maintained pH in range 8.2 -8.8 during the test by lime addition
- maintained ORP above +70 mv during the test by adding Na2S2O5 (MBS) as 100g/L solution
- Cu added as 5% solution of CuSO4
- monitored free cyanide by titration withtitration method after 30 min
- solution assay for CN species and other environmental parameters

TEST DATA

Time	MBS	Lime	CuSO4	pH	ORP	Free CN	Feed and Final Solution Assay			
							(Total)CN-	(WAD)CN-	SCN-	CNO-
hours	g	g	g		mV	mg/L	mg/L	mg/L	mg/L	mg/L
0.0				10.7	-100	690.2	915.0	542.5	20.4	258.9
0.5	2.7			8.4	67	212.4				
1.0	1.8			8.7	77	95.6				
1.5	1.4			8.6	98	63.7				
2.0	1.4			8.6	109	21.2				
2.5	1.0			8.7	163	10.6				
3.0	0.5			8.7	178					
3.5	0.5			8.5	192	<2	0.15	0.07	206.0	493.7
Total	9.3	2.7	1.4							

CYANIDE DESTRUCTION TEST REPORT

Client: Tyhee Gold Corp. - Yellowknife Gold Project
Test: DT-5
Sample: CIL5 Cyanide leach residue slurry (OM-723 Comp)

Date: 7-May-12
Project: 1105509

Objective: Batch cyanide destruction test by Inco process

TEST CONDITIONS

Solids:	596 g
Slurry volume	1.7 L
Initial Free CN:	796.4 mg/L
Initial ORP:	-49 mV
Initial pH:	11.2
Test Duration:	3.5 hours
MBS Consumption:	11.11 g/gTCN
SO2 Consumption:	7.49 gSO2/TCN
CuSO4 Consumption:	1.40 g/gTCN

TEST DESCRIPTION

- Test conducted in a 2 L reactor with overhead agitation
- air sparged via an air pump
- maintained pH in range 8.2 -8.8 during the test by lime addition
- maintained ORP above +70 mv during the test by adding Na2S2O5 (MBS) as 100g/L solution
- Cu added as 5% solution of CuSO4
- monitored free cyanide by titration withtitration method after 30 min
- solution assay for CN species and other environmental parameters

TEST DATA

Time	MBS	Lime	CuSO4	pH	ORP	Free CN	Feed and Final Solution Assay			
							(Total)CN-	(WAD)CN-	SCN-	CNO-
hours	g	g	g		mV	mg/L	mg/L	mg/L	mg/L	mg/L
0.0				11.2	-49	796.4	630.0	355.0	30.7	173.1
0.5	2.5			8.5	76	212.4				
1.0	1.9			8.3	80	169.9				
1.5	1.7			8.5	95	74.3				
2.0	1.5			8.2	95	21.2				
2.5	1.5			8.4	138	10.6				
3.0	1.5			8.2	136					
3.5	1.3			8.3	188	<2	0.08	0.06	53.5	313.5
Total	11.9	6.9	1.5							

CYANIDE DESTRUCTION TEST REPORT

Client: Tyhee Gold Corp. - Yellowknife Gold Project
Test: DT-6
Sample: CIL6 Cyanide leach residue slurry (Bruce Zone Comp)

Date: 7-May-12
Project: 1105509

Objective: Batch cyanide destruction test by Inco process

TEST CONDITIONS

Solids:	666	g
Slurry volume	1.8	L
Initial Free CN:	849.5	mg/L
Initial ORP:	-61	mV
Initial pH:	10.8	
Test Duration:	3.0	hours
MBS Consumption:	9.26	g/gTCN
SO_2 Consumption:	6.24	gSO_2/TCN
$CuSO_4$ Consumption:	4.18	g/gTCN

TEST DESCRIPTION

- Test conducted in a 2 L reactor with overhead agitation
- air sparged via an air pump
- maintained pH in range 8.2 -8.8 during the test by lime addition
- maintained ORP above +70 mv during the test by adding $Na_2S_2O_5$ (MBS) as 100g/L solution
- Cu added as 5% solution of $CuSO_4$
- monitored free cyanide by titration withtitration method after 30 min

- solution assay for CN species and other environmental parameters

TEST DATA

Time	MBS	Lime	$CuSO_4$	pH	ORP	Free CN	Feed and Final Solution Assay			
							(Total)CN-	(WAD)CN-	SCN-	CNO-
hours	g	g	g		mV	mg/L	mg/L	mg/L	mg/L	mg/L
0.0				10.8	-61	849.5	930.0	590.0	15.0	180.7
0.5	4.8			8.4	71	477.8				
1.0	3.8			8.3	68	318.5				
1.5	2.4			8.4	79	63.7				
2.0	1.7			8.6	132	10.6				
2.5	1.4			8.4	262					
3.0	1.4			8.3	266	<2	<0.05	<0.05	24.9	218.6
Total	15.5	7.3	7.0							

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SOLUTION ANALYSIS REPORT

Client: Tyhee Gold Corp. - Yellowknife Gold Project
Sample: DT1 to DT6 Feed Solutions

Date: 7-May-12
Project: 1105509

Items	Unit	Sample ID						Analytical
		DT1 Feed (OM-Master Comp)	**DT2 Feed** (OM-105 Comp)	**DT3 Feed** (OM-417 Comp)	**DT4 Feed** (OM-559 Comp)	**DT5 Feed** (OM-723 Comp)	**DT6 Feed** (Bruce Zone Comp)	**Method**
TCN	mg/L	1225.00	605.00	630.00	915.00	630.00	930.00	Env
WAD CN	mg/L	267.50	137.50	465.00	542.50	355.00	590.00	Env
SCN	mg/L	3211.87	3814.10	732.71	20.43	30.71	15.01	Env
CNO	mg/L	112.03	123.81	211.44	258.95	173.14	180.68	Env
SO4	g/L	1.33	2.94	1.56	0.84	1.28	0.49	Wet Assay
Ag	mg/L	0.055	0.28	0.09	0.065	0.07	0.05	H2O ICP
Al	mg/L	0.55	<0.2	1.55	2.175	1.52	2.94	H2O ICP
As	mg/L	1.6	<0.2	125.82	261.98	0.73	56.2	H2O ICP
Ba	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	0.01	H2O ICP
Bi	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	H2O ICP
Ca	mg/L	6.565	233.31	2.76	15.84	31.19	5.04	H2O ICP
Cd	mg/L	0.06	<0.01	0.02	<0.01	0.02	0.01	H2O ICP
Co	mg/L	3.025	3.79	2.4	0.76	1.76	1.13	H2O ICP
Cr	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	H2O ICP
Cu	mg/L	108.395	110.64	108.21	90.03	207.11	106.01	H2O ICP
Fe	mg/L	557.75	498.6	175.4	230.2	72.06	115.6	H2O ICP
Hg	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	H2O ICP
K	mg/L	15.975	24.09	16.2	15.165	10.96	10.53	H2O ICP
La	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	H2O ICP
Mg	mg/L	0.14	1.22	0.13	0.27	<0.1	0.3	H2O ICP
Mn	mg/L	<0.05	<0.05	0.89	1.295	0.23	0.62	H2O ICP
Mo	mg/L	0.66	0.81	0.36	0.32	0.15	0.18	H2O ICP
Na	mg/L	1954.0	2534.0	1430.0	1532.5	1590.0	1171.0	H2O ICP
Ni	mg/L	1.28	1.05	0.44	0.465	0.37	0.49	H2O ICP
P	mg/L	<0.1	<0.1	0.3	0.175	0.23	0.3	H2O ICP
Pb	mg/L	0.105	0.1	0.11	0.115	0.21	0.19	H2O ICP
Sb	mg/L	0.295	<0.1	0.13	0.175	0.16	0.25	H2O ICP
Sc	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	H2O ICP
Sr	mg/L	0.03	0.33	0.02	0.03	0.12	0.02	H2O ICP
Ti	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	0.13	H2O ICP
Tl	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	H2O ICP
V	mg/L	<0.01	<0.01	0.01	0.02	0.01	0.05	H2O ICP
W	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	H2O ICP
Zn	mg/L	14.94	0.44	9.9	3.695	2.3	6.32	H2O ICP
Zr	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	H2O ICP

Appendix B

Static Testing Results

ACID BASE ACCOUNTING TEST REPORT

Modified Sobek Method

Client: Tyhee Gold Corp. - Yellowknife Gold Project
Sample: Ormsby flotation tails

Date: 7-May-12
Project: 1105509

Item	Sample ID	Total S %	S^{-2} %	Sulfate S %	Fizz Rating	Paste pH	Acid Potential	Neutralization Potential (NP) Actual	Ratio	Net
1	OM-Master Comp flotation tailing	0.16	0.10	0.04	None	7.8	3.9	21.1	5.38	17.2
2	OM-105 Comp flotation tailing	0.12	0.06	0.03	None	8.2	2.7	22.4	8.34	19.7
3	OM-417 Comp flotation tailing	0.11	0.07	0.03	None	8.2	2.6	23.4	9.06	20.8
4	OM-559 Comp flotation tailing	0.12	0.08	0.03	None	8.2	2.9	33.0	11.49	30.2
5	OM-723 Comp flotation tailing	0.11	0.08	0.04	None	8.1	2.4	39.1	16.02	36.6
6	Bruce Zone Comp flotation tailing	0.08	0.05	0.03	None	8.4	1.8	18.2	10.18	16.4
7	OM-Master Comp detoxed tailing	22.90	20.16	1.18	None	7.9	678.8	19.8	0.03	-659.1
8	OM-105 Comp detoxed tailing	24.90	22.65	1.05	None	7.3	745.3	15.9	0.02	-729.5
9	OM-417 Comp detoxed tailing	17.20	15.46	1.22	None	8.4	499.3	24.2	0.05	-475.0
10	OM-559 Comp detoxed tailing	16.70	15.35	0.92	None	8.7	493.1	20.0	0.04	-473.1
11	OM-723 Comp detoxed tailing	20.00	17.41	1.08	None	7.9	591.4	38.6	0.07	-552.8
12	Bruce Zone Comp detoxed tailing	6.48	5.03	1.17	None	8.6	165.9	17.5	0.11	-148.4
DUP	OM-Master Comp flotation tailing	0.16	0.10	0.04	None	7.8	3.9	20.7	5.27	16.7
DUP	OM-417 Comp flotation tailing	0.11	0.07	0.03	None	8.5	3.5	22.9	6.53	19.4
DUP	OM-723 Comp detoxed tailing	20.00	17.41	1.08	None	7.9	591.4	38.5	0.07	-552.9
DUP	Bruce Zone detoxed tailing	6.48	5.03	1.17	None	8.6	165.9	17.0	0.10	-148.8

Alice Shi, Ph.D.
General Manager

Notes:
1. Analytical procedures from "Field and Laboratory Methods Applicable to Overburden and Minesoils". EPA 600/2-78-054, 1978. pp. 45-55.
2. Actual NP = Neutralization potential as determined by Sobek acid consumption test.
3. Acid potential = (% total sulphur-% sulphate sulphur) X 31.25
4. NP Ratio = Actual NP / Acid potential
5. Net NP = Actual NP - Acid potential
6. The acid potential and the neutralizing potentials are expressed in Kg $CaC0_3$ equivalent per tonne of sample.
7. **Samples with negative Net NP are potential acid producers**

NET ACID GENERATION TEST REPORT

Tyhee Gold Corp. - Yellowknife Gold Project	**Date:**
Ormsby/Bruce Zone flotation tails and detoxed tails	**Project:**

Item	**Sample ID**	**NAG pH**	**NAG** (kg H2SO4/tonne)
1	OM-Master Comp flotation tailing	7.5	**N/A**
2	OM-105 Comp flotation tailing	7.7	**N/A**
3	OM-417 Comp flotation tailing	7.6	**N/A**
4	OM-559 Comp flotation tailing	8.2	**N/A**
5	OM-723 Comp flotation tailing	8.3	**N/A**
6	Bruce Zone Comp flotation tailing	7.5	**N/A**
7	OM-Master Comp detoxed tailing	2.4	**53.7**
8	OM-105 Comp detoxed tailing	2.2	**67.9**
9	OM-417 Comp detoxed tailing	2.1	**67.6**
10	OM-559 Comp detoxed tailing	2.0	**99.7**
11	OM-723 Comp detoxed tailing	2.1	**87.1**
12	Bruce Zone Comp detoxed tailing	2.6	**22.0**

Titration end point: pH 4.5

SYNTHETIC PRECIPITATION LEACHING PROCEDURE (SPLP) TEST REPORT

Client: Tyhee Gold Corp. - Yellowknife Gold Project
Sample: as specified SPLP leachate from Ormsby tailing

Date: 14-May-12
Project: 1105509

Procedure: The test was performed according to EPA Method 1312 - SPLP test procedure

Items	Unit	Sample ID				Detection Limits		Analytical
		OM-Master Comp flotation tailing	OM-Master Comp flotation tailing, DUP	Bruce Zone Comp flotation tailing	OM-Master Comp detoxed tailing	Min.	Max.	Method
pH		8.8	8.8	9.1	8.3	0.0	14.0	Env
Ag	mg/L	<0.00002	<0.00002	0.01446	<0.00002	0.00002	0.20000	Env ICPMS
Al	mg/L	5.858	<0.002	<0.002	0.279	0.002	20.000	Env ICPMS
As	mg/L	<0.0005	0.0168	0.0687	<0.0005	0.0005	5.0000	Env ICPMS
B	mg/L	<0.02	<0.02	<0.02	<0.02	0.02	200.00	Env ICPMS
Ba	mg/L	0.0067	0.0109	0.0441	0.0008	0.0001	1.0000	Env ICPMS
Be	mg/L	<0.001	<0.001	0.002	<0.001	0.001	10.000	Env ICPMS
Bi	mg/L	<0.001	<0.001	<0.001	<0.001	0.001	10.000	Env ICPMS
Ca	mg/L	6.09	4.46	185.44	<0.05	0.05	500.00	Env ICPMS
Cd	mg/L	0.00048	0.00011	<0.00005	<0.00005	0.00005	0.50000	Env ICPMS
Co	mg/L	<0.0002	<0.0002	0.0432	0.0004	0.0002	2.0000	Env ICPMS
Cr	mg/L	<0.001	<0.001	<0.001	<0.001	0.001	10.000	Env ICPMS
Cu	mg/L	0.0157	0.0110	0.0677	0.0079	0.0002	2.0000	Env ICPMS
Fe	mg/L	<0.03	<0.03	8.40	<0.03	0.03	300.00	Env ICPMS
Ga	mg/L	0.0007	0.0003	<0.0001	<0.0001	0.0001	1.0000	Env ICPMS
Hg	mg/L	0.00945	0.00868	0.02150	0.01043	0.00001	0.10000	Env ICPMS
K	mg/L	4	4	<2	<2	2	20000	Env ICPMS
Li	mg/L	0.007	<0.005	0.006	<0.005	0.005	50.000	Env ICPMS
Mg	mg/L	0.5	0.2	0.5	<0.1	0.1	1000.0	Env ICPMS
Mn	mg/L	0.0295	0.1304	0.0765	0.0705	0.0001	1.0000	Env ICPMS
Mo	mg/L	0.0166	0.0116	0.0070	0.0008	0.0001	1.0000	Env ICPMS
Na	mg/L	<2	<2	50	<2	2	20000	Env ICPMS
Ni	mg/L	0.003	0.003	0.008	0.003	0.001	10.000	Env ICPMS
P	mg/L	<0.3	<0.3	<0.3	<0.3	0.3	3000.0	Env ICPMS
Pb	mg/L	0.0007	0.0133	<0.0001	<0.0001	0.0001	1.0000	Env ICPMS
Sb	mg/L	0.0004	0.0009	0.0315	0.0008	0.0002	2.0000	Env ICPMS
Se	mg/L	<0.002	<0.002	<0.002	<0.002	0.002	20.000	Env ICPMS
Sc	mg/L	0.002	0.001	<0.001	<0.001	0.001	10.000	Env ICPMS
Si	mg/L	6.80	7.20	8.10	3.00	0.05	500.00	Env ICPMS
Sn	mg/L	<0.002	<0.002	<0.002	<0.002	0.002	20.000	Env ICPMS
Sr	mg/L	0.0146	0.0118	0.4413	<0.0002	0.0002	2.0000	Env ICPMS
Ti	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	100.00	Env ICPMS
Tl	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2.0000	Env ICPMS
V	mg/L	0.014	0.013	<0.002	0.004	0.002	20.000	Env ICPMS
Zn	mg/L	0.044	0.032	0.021	0.013	0.001	10.000	Env ICPMS

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SUPERNATANT ANALYSIS REPORT

Client: Tyhee Gold Corp. - Yellowknife Gold Project
Sample: as specified Ormsby flotation tailing supernatant

Date: 07-May-12
Project: 1105509

Items	Unit	Sample ID							Detection Limits		Analytical
		OM-Master Comp flotation tailing	OM-Master Comp flotation tailing, DUP	OM-105 Comp flotation tailing	OM-417 Comp flotation tailing	OM-559 Comp flotation tailing	OM-723 Comp flotation tailing	Bruce Zone Comp flotation tailing	Min.	Max.	Method
PH		8.0	8.0	8.1	8.0	7.9	7.9	8.0	1.0	12.0	Env
TSS	mg/L	3.0	3.0	16.0	4.0	4.0	2.0	8.0	1.0	1000.0	Env
TDS	mg/L	13.0	12.0	141.0	146.0	135.0	147.0	151.0	1.0	1000.0	Env
Alkalinity(bicarbonate)	mg/L	59.7	73.9	73.7	84.0	76.0	77.0	74.9	5.0	5000.0	Env
Alkalinity(Total)	mg/L	60.3	74.6	74.6	84.8	76.6	77.6	75.6	5.0	5000.0	Env
F	mg/L	0.55	0.60	0.59	0.69	0.74	0.70	0.58	0.5	500.0	Env
Cl	mg/L	3.70	3.80	6.04	8.30	8.22	8.12	5.99	0.5	500.0	Env
NO3	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	200.0	Env
SO4	mg/L	30.49	30.51	48.91	40.12	40.37	46.88	39.43	1.0	1000.0	Env
Total N	mg/L	51.0	54.0	6.0	27.0	<5	<5	<5	5.0	5000.0	Env
Total CN	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	200.00	Env
WAD CN	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	200.00	Env
Free CN	mg/L	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	2.00	200.00	Env
Ag	mg/L	0.00191	0.00106	0.00046	0.00047	0.00029	0.00027	0.00052	0.00002	0.20000	Env ICP
Al	mg/L	0.190	0.120	0.290	0.250	0.140	0.110	0.160	0.002	20.000	Env ICP
As	mg/L	0.0079	0.0018	0.0105	0.0201	0.1284	0.0033	0.0041	0.0005	5.0000	Env ICP
B	mg/L	0.03	0.03	0.03	0.04	0.03	0.22	0.03	0.02	200.00	Env ICP
Ba	mg/L	0.0155	0.0166	0.0135	0.0164	0.0216	0.0149	0.0193	0.0001	1.0000	Env ICP
Be	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	10.000	Env ICP
Bi	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	10.000	Env ICP
Ca	mg/L	22.79	22.58	21.63	22.01	20.49	28.19	22.01	0.05	500.00	Env ICP
Cd	mg/L	0.00025	0.00022	0.00065	0.00080	0.00080	0.00085	0.00096	0.00005	0.50000	Env ICP
Co	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	0.0002	2.0000	Env ICP
Cr	mg/L	0.019	0.020	0.024	0.031	0.026	0.027	0.026	0.001	10.000	Env ICP
Cu	mg/L	<0.0002	<0.0002	0.0004	0.0004	0.0003	0.0003	0.0002	0.0002	2.0000	Env ICP
Fe	mg/L	0.34	0.09	0.51	0.25	0.15	0.04	0.16	0.03	300.00	Env ICP
Ga	mg/L	0.0001	0.0001	0.0002	0.0003	0.0002	0.0001	0.0001	0.0001	1.0000	Env ICP
Hg	mg/L	0.00260	0.00207	0.00212	0.00150	0.00125	0.00123	0.00102	0.00001	0.10000	Env ICP
K	mg/L	8	9	13	13	18	11	13	2	20000	Env ICP
Li	mg/L	0.012	0.011	0.015	0.010	0.014	0.006	0.009	0.005	50.000	Env ICP
Mg	mg/L	2.7	2.6	3.6	3.5	2.6	6.0	4.1	0.1	1000.0	Env ICP
Mn	mg/L	0.0700	0.0600	0.0600	0.0400	0.0500	0.0400	0.0400	0.0001	1.0000	Env ICP
Mo	mg/L	0.0922	0.0927	0.2602	0.3256	0.3052	0.3636	0.4101	0.0001	1.0000	Env ICP
Na	mg/L	10	10	22	24	16	12	15	2	20000	Env ICP
Ni	mg/L	0.000	0.001	0.001	0.001	<0.001	0.001	<0.001	0.001	10.000	Env ICP
P	mg/L	90.5	46.7	38.8	31.6	27.2	24.5	21.6	0.3	3000.0	Env ICP
Pb	mg/L	0.0058	0.0053	0.0051	0.0049	0.0037	0.0027	0.0034	0.0001	1.0000	Env ICP
Sb	mg/L	0.0015	0.0016	0.0013	0.0013	0.0011	0.0011	0.0010	0.0002	2.0000	Env ICP
Se	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	20.000	Env ICP
Sc	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	10.000	Env ICP
Si	mg/L	1.62	1.66	1.93	1.70	1.76	1.95	2.00	0.05	500.00	Env ICP
Sn	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	20.000	Env ICP
Sr	mg/L	0.0533	0.0534	0.0759	0.0710	0.0726	0.0805	0.0671	0.0002	2.0000	Env ICP
Ti	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	100.00	Env ICP
Tl	mg/L	0.0003	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	2.0000	Env ICP
V	mg/L	0.014	0.013	0.011	0.011	0.010	0.009	0.008	0.002	20.000	Env ICP
Zn	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	10.000	Env ICP

SOLIDS ANALYSIS REPORT

Client: Tyhee Gold Corp. - Yellowknife Gold Project
Sample: as specified Ormsby detoxed tailing solids

Date: 07-May-12
Project: 1105509

Items	Units	Sample ID						Detection Limits		Analytical
		OM-Master Comp detoxed tailing	OM-105 Comp detoxed tailing	OM-417 Comp detoxed tailing	OM-559 Comp detoxed tailing	OM-723 Comp detoxed tailing	Bruce Zone Comp detoxed tailing	Min.	Max.	Method
S(t)	%	22.90	24.90	17.20	16.70	20.00	6.48	0.01	20	Leco
S-2	%	20.16	22.65	15.46	15.35	17.41	5.03	0.01	20	AsyWet
S(SO4)	ppm	11778	10489	12240	9211	10751	11724	10	10000	Na2CO3 ICP
Ag	ppm	<0.1	<0.1	0.2	<0.1	<0.1	0.2	0.1	100	AR ICP
Al	%	0.87	0.63	1.33	0.90	1.08	1.26	0.01	10	AR ICP
As	ppm	13685	12724	25228	78197	3190	4943	5	10000	AR ICP
Ba	ppm	<10	<10	<10	<10	<10	11	10	10000	AR ICP
Bi	ppm	<2	<2	<2	<2	27	<2	2	10000	AR ICP
Ca	%	2.76	1.69	3.14	1.68	2.84	2.70	0.01	10	AR ICP
Cd	ppm	22.6	18.6	11.8	12.2	9.0	4.2	0.5	1000	AR ICP
Co	ppm	358	424	424	350	392	140	1	10000	AR ICP
Cr	ppm	152	155	135	118	132	113	1	10000	AR ICP
Cu	ppm	3205	2514	1996	1644	3090	2036	1	10000	AR ICP
Fe	%	24.29	28.21	18.06	19.17	16.37	7.55	0.01	10	AR ICP
Hg	ppm	<3	<3	<3	<3	<3	<3	3	10000	AR ICP
K	%	0.08	0.06	0.28	0.20	0.07	0.25	0.01	10	AR ICP
La	ppm	28	16	32	23	13	26	2	10000	AR ICP
Mg	%	0.28	0.19	0.46	0.31	0.45	0.47	0.01	10	AR ICP
Mn	ppm	459	319	626	452	392	669	5	10000	AR ICP
Mo	ppm	20	38	29	20	16	12	1	10000	AR ICP
Na	%	0.24	0.16	0.19	0.14	0.14	0.25	0.01	10	AR ICP
Ni	ppm	198	197	114	193	400	93	1	10000	AR ICP
P	ppm	4683	2248	4585	2844	1581	3069	10	50000	AR ICP
Pb	ppm	1135	117	129	103	153	39	2	10000	AR ICP
Sb	ppm	96	27	19	39	11	3	2	10000	AR ICP
Sc	ppm	6	4	12	6	8	10	1	10000	AR ICP
Sr	ppm	53	37	55	31	39	50	1	10000	AR ICP
Ti	%	0.04	0.02	0.09	0.06	0.11	0.14	0.01	10	AR ICP
Tl	ppm	<10	<10	<10	<10	<10	<10	10	10000	AR ICP
V	ppm	22	21	20	16	54	42	1	10000	AR ICP
W	ppm	101	125	82	77	63	23	10	5000	AR ICP
Zn	ppm	1889	677	1169	355	136	383	2	10000	AR ICP
Zr	ppm	25	23	38	31	15	11	2	1000	AR ICP

Knight Piésold CONSULTING

Appendix C

Toxicity Testing Results

AQUA-TOX, INC.
4880 ROBB ST. STE 8
WHEAT RIDGE, CO 80033

WORKING WITH INDUSTRY TO KEEP AMERICA'S WATER ALIVE

ATI

AQUA-TOX, INC.

ATI OFFERS A FULL SERVICE AQUATIC TOXICOLOGY/ WET TEST LABORATORY

ACUTE NPDES WHOLE EFFLUENT TOXICITY REPORT

Knight Piesold

Discharge Site: Supernatant

Sample Dates: 2012 April 30
ATI Lot Number: 043012-1

Report prepared for: Mr. Steven Lange
Mr. Sam Bush
5030 Nome Unit A
Denver, CO 80239

Report prepared by: Aqua-Tox, Inc.
Mr. Jeffrey Hoffman
Ms. Karen Bilsborrow
4880 Robb Street, Suite 8
Wheat Ridge, CO 80033

5/8/12
Laboratory Director: Jeffrey Hoffman

Karen Bilsborrow 5/8/12
Laboratory Manager: Karen Bilsborrow

Reported Data

Aqua-Tox, Inc.
4880 Robb Street, Suite 8
Wheat Ridge, CO 80033
(303) 621-4880 www.aqua-tox.com

ACUTE TOXICITY REPORT
Daphnia magna

CLIENT NAME: Knight Piesold
50 % MORTALITY TEST: Pass
% SURVIVAL IN 100% DILUTION: 90%
SAMPLE DATE: 04-30-12 TIME: 13:00P
ORGANISM: *Daphnia magna* AGE: < 24 hours old
TEST START: 04-30-12 16:25
SAMPLE I.D.: 043012-1
TEST RESULT LC50: >100%
CLIENT ID: Supernatant
TEST FINISH: 05-02-12 16:25
TYPE OF TEST: LC50, 48 hours, static, renewal, moderately hard fresh synthetic dilution water.

MODERATELY HARD FRESH SYNTHETIC DILUTION WATER CONSTITUENT

AMMONIA: ND
HARDNESS: 86.17 mg/L
ALKALINITY: 59.39 mg/L
pH: 8.09
D.O.: 7.35 mg/L
CHLORINE: ND
TEMPERATURE: 20.1 deg C

SURVIVAL DATA

DILUTIONS (%)

DATE	(HOURS)	CONTROL	6.25	12.5	25	50	75	100
4/30/2012	INITIAL	20	20	20	20	20	20	20
5/1/2012	24	20	20	20	20	20	20	20
5/2/2012	48	19	20	20	20	20	19	18
	MORTALITY:	1	0	0	0	0	1	2
	% SURVIVAL:	100%	100%	100%	100%	100%	100%	100%

DAILY CHEMISTRY - (MIN/MAX)

DILUTIONS (%)

	CONTROL	6.25	12.5	25	50	75	100
CONDUCTIVITY (microS)	324/340	322/336	319/333	314/328	304/321	292/310	283/298
D.O. (mg/L)	7.4/7.8	7.4/7.8	7.4/7.8	7.4/7.8	7.3/7.8	7.3/7.8	7.3/7.8
pH	8.1/8.2	8.1/8.3	8.1/8.3	8.1/8.3	8.1/8.3	8.2/8.4	8.2/8.4
TEMPERATURE (deg C)	20.1/20.7	20.1/20.7	20.1/20.7	20.1/20.7	20.1/20.7	20.1/20.7	20.1/20.7

GENERAL CHEMISTRY - SAMPLE

AMMONIA: ND
HARDNESS: 79.76 mg/L
ALKALINITY: 82.62 mg/L
pH: 8.24
D.O.: 7.27 mg/L
CHLORINE: ND
TEMPERATURE: 20.1 deg C
D.O AFTER AERATION: NA

ANOEC	CALCULATION METHOD	METHOD REFERENCE
75%	SPEARMAN-KARBER	EPA -821-R-02-012 October 2002 pg.78

ADDITIONAL COMMENTS:

Analysis Conducted by: J-Or
Date: 5-8-12

Reviewed by:
Date: 5/8/12

Aqua-Tox, Inc.
4880 Robb Street, Suite 8
Wheat Ridge, CO 80033
(303) 621-4880 www.aqua-tox.com

ACUTE TOXICITY REPORT
***Pimephales promelas* - Fathead Minnow**

CLIENT NAME: Knight Piesold
SAMPLE I.D.: 043012-1
50 % MORTALITY TEST: Pass
TEST RESULT LC50: >100%
% SURVIVAL IN 100% DILUTION: 100%
SAMPLE DATE: 04-30-12 TIME: 13:00P
CLIENT ID: Supernatant
ORGANISM: *Pimephales promelas* DOH: 4/25/12
TEST START: 04-30-12 16:50
TEST FINISH: 05-04-12 16:50
TYPE OF TEST: LC50, 96 hours, static, renewal, moderately hard fresh synthetic dilution water.

MODERATELY HARD FRESH SYNTHETIC DILUTION WATER CONSTITUENT

AMMONIA: ND
D.O.: 7.35 mg/L
HARDNESS: 86.17 mg/L
CHLORINE: ND
ALKALINITY: 59.39 mg/L
TEMPERATURE: 20.1 deg C
pH: 8.09

SURVIVAL DATA

DILUTIONS (%)

DATE	(HOURS)	CONTROL	6.25	12.5	25	50	75	100
4/30/2012	INITIAL	20	20	20	20	20	20	20
5/1/2012	24	20	20	20	20	20	20	20
5/2/2012	48	20	20	20	20	20	20	20
5/3/2012	72	19	20	20	20	20	20	20
5/4/2012	96	19	20	20	20	20	20	20
	MORTALITY:	1	0	0	0	0	0	0
	% SURVIVAL:	95%	100%	100%	100%	100%	100%	100%

DAILY CHEMISTRY - (MIN/MAX)

DILUTIONS (%)

	CONTROL	6.25	12.5	25	50	75	100
CONDUCTIVITY (microS)	324/335	322/331	319/328	314/325	304/314	292/303	283/294
D.O. (mg/L)	7.0/7.6	6.9/7.6	6.9/7.6	6.9/7.6	6.8/7.6	6.8/7.6	6.8/7.6
pH	7.8/8.1	7.8/8.1	7.9/8.1	7.9/8.1	7.9/8.1	8.0/8.2	8.0/8.2
TEMPERATURE (deg C)	20.2/20.7	20.2/20.7	20.2/20.7	20.2/20.7	20.2/20.7	20.2/20.7	20.2/20.7

GENERAL CHEMISTRY - SAMPLE

AMMONIA: ND
D.O.: 7.27 mg/L
HARDNESS: 79.76 mg/L
CHLORINE: ND
ALKALINITY: 82.62 mg/L
TEMPERATURE: 20.1 deg C
pH: 8.24
D.O AFTER AERATION: NA

ANOEC	CALCULATION METHOD	METHOD REFERENCE
100%	SPEARMAN-KARBER	EPA -821-R-02-012 October 2002 pg.78

ADDITIONAL COMMENTS:

Analysis Conducted by: J-O
Date: 5-8-12

Reviewed by: [signature]
Date: 5/8/12

Benchsheets

Daily Acute Chemistry Benchsheet

Facility Name: Knight - Resold
Source: Supernatant
Lot # : 043012-1

Organism: Dm
Dilution Water: MHFSW

Chemistry for Test Water as Received:						Units:
Residual Chlorine	Alkalinity	Ammonia	Hardness	D.O. initial	pH initial	Conductivity = microS
ND/ND	82.62	ND	79.76	7.17	8.24	DO,alk,hard,NH3 = mg/L

Test Start, Date/Time: 04/30/12 1625 Test Finish, Date/Time: 05/02/12 1625

EFFLUENT CONCENTRATIONS %		CHEMICAL TEST	COMMENT	DAY OF TEST (HOURS) INT.	24	48	72	96
LAB	A	COND.		324	340	332		
CONTROL	B	DO		7.35	7.47	7.80		
0% Sample	C	pH		8.09	8.22	8.10		
	D	TEMP.		20.1	20.6	20.7		
6.25% Sample	A	COND.		322	336	333		
	B	DO		7.44	7.47	7.80		
	C	pH		8.06	8.27	8.28		
	D	TEMP.		20.1	20.6	20.7		
12.5% Sample	A	COND.		319	333	330		
	B	DO		7.44	7.47	7.80		
	C	pH		8.07	8.28	8.32		
	D	TEMP.		20.1	20.6	20.7		
25% Sample	A	COND.		314	328	325		
	B	DO		7.35	7.46	7.80		
	C	pH		8.11	8.30	8.34		
	D	TEMP.		20.1	20.6	20.7		
50% Sample	A	COND.		304	321	314		
	B	DO		7.31	7.46	7.80		
	C	pH		8.13	8.32	8.34		
	D	TEMP.		20.1	20.6	20.7		
75% Sample	A	COND.		292	316	305		
	B	DO		7.26	7.46	7.81		
	C	pH		8.20	8.34	8.37		
	D	TEMP.		20.1	20.6	20.7		
100% Sample	A	COND.		283	298	292		
	B	DO		7.27	7.45	7.81		
	C	pH		8.24	8.37	8.39		
	D	TEMP.		20.1	20.6	20.7		
ANALYST				[illegible]	[illegible]	[illegible]		

Control Limits: D.O. 4.0-Saturated, pH 6.4-8.4, Temperature = 19.0-21.0 deg. C

Final LC-50	NOEC	Statistical Method Used
>100%	~~100%~~	Spearman-Karber

75% = NOEC
2 deaths in 100% [illegible] 5/2/12

Aqua-Tox, Inc.
48-hour Mortality Benchsheet

Test Type: 48-hour static renewal
Facility Name: Knight-Piesold
Lot No.: 043012-1
Dilution Water: MHFSW
Test Initiation: 04/30/12 1625
Test Duration: 48 hours

NPDES Permit # :
Source: Supernatant
Organism/Age: ***Daphnia magna*** **< 24 hours old**
Analyst(s): J. Dix, K. Bilsborrow, J. Hoffman
Test Termination: 05/02/12 1625
Temperature: 20 +/- 1 deg C

	0 Hours (Survival)				24 Hours (Survival)				48 Hours (Survival)				Total Mortality	Percent Survival
Concentration %	A	B	C	D	A	B	C	D	A	B	C	D		
Lab control (%)	5	5	5	5	5	5	5	5	5	5	4	5	1	95
6.25	5	5	5	5	5	5	5	5	5	5	5	5	0	100
12.5%	5	5	5	5	5	5	5	5	5	5	5	5	0	100
25%	5	5	5	5	5	5	5	5	5	5	5	5	0	100
50%	5	5	5	5	5	5	5	5	5	5	5	5	0	100
75%	5	5	5	5	5	5	5	5	5	5	4	5	1	95
100%	5	5	5	5	5	5	5	5	5	4	5	4	2	90

Comments:

D.O. initial (mg/L) = 7.18 mg/L

Air start = n/a

Air end = n/a

D.O. final (mg/L) = n/a

Daily Chemistry Benchsheet

Facility Name: Knight-Piesold
Source: Supernatant
Lot # : 043012-1
Organism: Pp
Dilution Water: MHFSW

Chemistry for Test Water as Received:						Units:
Residual Chlorine	Alkalinity	Ammonia	Hardness	D.O. initial	pH initial	Conductivity = microS
ND/ND	82.62	ND	79.76	7.17	8.24	DO,alk,hard,NH3 = mg/L

Test Start, Date/Time: 04/30/12 1650 Test Finish, Date/Time: 05/04/12 1650

EFFLUENT CONCENTRATIONS %		CHEMICAL TEST	COMMENT	DAY OF TEST (HOURS) INT.	24	48	72	96
LAB	A	COND.		324	335	326	332	330
CONTROL	B	DO		~~[illegible]~~ 7.35	7.10	7.58	6.96	7.35
0% Sample	C	pH		8.09	8.05	7.95	7.84	7.96
	D	TEMP.		20.2	20.6	20.7	20.3	20.2
6.25% Sample	A	COND.		322	331	330	331	328
	B	DO		7.44	7.10	7.58	6.99	7.35
	C	pH		8.06	8.04	8.05	7.84	7.93
	D	TEMP.		20.2	20.6	20.7	20.3	20.2
12.5% Sample	A	COND.		319	328	328	326	325
	B	DO		7.44	[illegible]	7.58	6.91	7.32
	C	pH		8.07	8.07	8.08	7.87	7.98
	D	TEMP.		20.2	20.6	20.7	20.3	20.2
25% Sample	A	COND.		314	325	323	321	320
	B	DO		7.35	[illegible]	7.57	6.85	7.36
	C	pH		8.11	8.03	809	7.85	~~[illegible]~~ 8.02
	D	TEMP.		20.2	20.6	20.7	20.3	20.2
50% Sample	A	COND.		304	314	310	310	309
	B	DO		7.34	7.12	7.57	6.83	7.31
	C	pH		8.13	8.10	8.14	7.89	8.04
	D	TEMP.		20.2	20.6	20.7	20.3	20.2
75% Sample	A	COND.		292	303	301	301	299
	B	DO		7.26	7.13	7.56	6.80	7.34
	C	pH		8.20	8.17	8.18	7.98	8.09
	D	TEMP.		20.2	20.6	20.7	20.3	20.2
100% Sample	A	COND.		283	294	291	292	289
	B	DO		7.27	7.17	7.56	6.78	7.33
	C	pH		8.24	8.21	8.24	8.02	8.13
	D	TEMP.		20.2	20.6	20.7	20.3	20.2
ANALYST				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Control Limits: D.O. 4.0-Saturated, pH 6.4-8.4, Temperature = 19.0-21.0 deg. C

Final LC-50	NOEC	Statistical Method Used
[illegible]	100%	Spearman-Karber

Aqua-Tox, Inc.
96-hour Mortality Benchsheet

Test Type: 96-hour static renewal
Facility Name: Knight - Piersol
Lot No.: 043012-1
Dilution Water: MHFSW
Test Initiation: 04/30/12 1050
Test Duration: 96 hours

NPDES Permit # :
Source: Supernatant
Organism/Age: ***Pimephales promelas*** **DOH:** 4/25/12
Analyst(s): J. Dix, K. Bilsborrow, J. Hoffman
Test Termination: 5/4/12 1050
Temperature: 20 +/- 1 deg C

	0 Hours (Survival)		24 Hours (Survival)		48 Hours (Survival)		72 Hours (Survival)		96 Hours (Survival)		Total Mortality	Percent Survival
Concentration %	A	B	A	B	A	B	A	B	A	B		
Lab control (0%)	10	10	10	10	10	10	10	9	10	9	1	95
6.25%	10	10	10	10	10	10	10	10	10	10	0	100
12.5%	10	10	10	10	10	10	10	10	10	10	0	100
25%	10	10	10	10	10	10	10	10	10	10	0	100
50%	10	10	10	10	10	10	10	10	10	10	0	100
75%	10	10	10	10	10	10	10	10	10	10	0	100
100%	10	10	10	10	10	10	10	10	10	10	0	100

Comments:

Artemia
[illegible]

D.O. initial (mg/L) = 7.[illegible] mg/L

Air start = n/a

Air end = n/a

D.O. final (mg/L) = n/a

Reported Chemistries

ALKALINITY BY TITRATION

Analyst: J. Hoffman/K. Bilsborrow	**Titration Solutions**	**Calibration**
Date: 05-01-2012	Solution 1: Sulfuric Acid	Na2CO3 Solution
Detection/Reporting Limit: 5mg/L	Source: FISCHER	Lot # S78419
SOP Information	Lot #: 114083	Made By: FISHER
Number: ATI-Alkalinity	Normality: 0.02020	Concentration: 0.05 M
Revision: N/A	Exp. Date: 2/25/2014	Expiration: 6-2012
Comments:		DCS True Value: 250
		Titrant Standard TV: 250

Sample Name	Lot Number	Sample Volume	Buret Start	Buret Stop	Final mL	Conc mg/L	Final Concentration (mg/L)	Titrant Normality
	titrant stdz	40	0.00	9.45	9.45			0.01997
	titrant stdz	40	0.00	9.43	9.43			0.02001
								% Recovery
	DCS	40	0.00	9.44	9.44	252.662	252.66	101.065
	DCS	40	0.00	9.46	9.46	253.197	253.20	101.279
043012-1	043012-1	50	0.00	4.09	4.09	82.618	82.62	
MHFSW	4/26/2012	25	0.00	1.47	1.47	59.388	59.39	

Lot # 043012-1

HARDNESS BY TITRATION

Analyst: J. Hoffman/K. Bilsborrow	Titration Solutions		Calibration	
Date: 05-01-2012	Solution 1:	EDTA	CaCO3 Solution	
Detection/Reporting Limit: 5mg/L	Source:	LABCHEM	Lot # 4105835	
SOP Information	Lot #:	A047-03	Made By: RICCA	
Number: ATI-Hardness	Normality:	0.02004	Concentration: 1000 mg/L	
Revision: N/A	Exp. Date:	2/21/2013	Expiration: 6-2012	
Comments:			DCS True Value:	400
			Titrant Standard TV:	400

Sample Name	Lot Number	Sample Volume	Buret Start	Buret Stop	Final mL	Conc mg/L	Final Concentration (mg/L)	Titrant Normality
	titrant stdz	10	0.00	9.96	9.96			0.02008
	titrant stdz	10	0.00	10.00	10.00			0.02000
								%Recovery
	Blank	25	0.00	0.00	0.00	0.000	0.00	
	DCS	25	0.00	10.02	10.02	401.605	401.60	100.401
	DCS	25	0.00	9.99	9.99	400.402	400.40	100.101
043012-1	043012-1	50	0.00	3.98	3.98	79.760	79.76	
MS	043012-1	50	0.00	14.02	14.02	280.963	280.96	
SD	043012-1	50	0.00	14.05	14.05	281.564	281.56	
MHFSW	4/26/2012	25	0.00	2.15	2.15	86.173	86.17	

Lot # 043012-1

Aqua-Tox, Inc.

4880 Robb Street, Unit 8
Wheat Ridge, CO 80033
Jeff Hoffman (303) 621-4880
Karen Bilsborrow (720) 253-4371
www.aqua-tox.com

CHAIN OF CUSTODY RECORD FOR WHOLE EFFLUENT TOXICITY TESTING

All WET samples have a 36-hour holding time, beginning at the termination of sampling.

Distribution of COC: White Copy = Stays with sample
Yellow Copy = Returned to client with report
Pink Copy = Field/Sampler copy

Client: Knight Piesold
Project Manager: Mr. Sam Bush
Address: 5030 Nome Unit A
City/State/Zip: Denver, CO 80239
Telephone #: 303-867-2254
Fax #:
Email: slange@knightpiesold.com

Sampler: Jane D. Bruce
Telephone #:
Project #: P/A DV101-00177.06
NPDES Permit #:

Carrier: ☐ UPS ☐ FedEx ☐ Other: ______

Turnaround Time: ☐ Standard (48-Hour E-mail Notification/15-Day Hard Copy)
☐ Other By:________(Date) Additional Fees May Apply

Sample Disposal: ☐ By Lab (After 30 Days) ☐ Return to Client
☐ Archive For ______ Days

Sample Identification	Date Sampled	Time	Number of Sample Containers	Sample Type: Composite = **C** Grab = **G**	ANALYSES REQUESTED – CHRONIC TESTS: IC_{25} 7-Day Surivial/Growth *Pimephales promelas* EPA-821-R-02-013 Method 1000.0	CHRONIC TESTS: IC_{25} 7-Day Survival/Reproduction *Ceriodaphnia dubia* EPA-821-R-02-013 Method 1002.0	ACUTE TESTS: LC_{50} 48-Hour *Daphnia magna* EPA-821-R-02-012 Method 2021.0	ACUTE TESTS: LC_{50} 96-Hour *Pimephales promelas* EPA-821-R-02-012 Method 2000.0	Other:	Other:	Possible Hazard Identification: 1=Non-Hazard 2=Flammable 3=Irritant 4=Poison 5=Unknown
Supernatant	4-30-12	13:00	2								

Special Instructions/Comments:

1) Relinquished by: (Signature)	Date/Time:	1) Received by: (Signature)	Date/Time:
	4/3?/12 13:00		[illegible] 1500
2) Relinquished by: (Signature)	Date/Time:	2) Received by: (Signature)	Date/Time:

Laboratory Use Only
Sample Condition: [illegible]
Sample Temp C: [illegible]
Headspace: Yes / No
Ice: Yes / No
Analyst: [illegible]

COC#: 2012-186